Pests

AND THEIR CONTROL

1946

FEBRUARY

VOL. 14, NO. 2

ORGAN OF THE PEST CONTROL INDUSTRY

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Fumigators
Termite Control Operators
Entomologists
Insecticide and Supply Mfgrs.

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Pests

and Their CONTROL

Exterminators, Fumigators, Termite Control Operators, Entomologists, Insecticide and Supply Manufacturers

COOPERATING WITH NATIONAL PEST CONTROL ASSOCIATION

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EDITORIAL

Tomorrow's PCO Service

DESPITE the admitted difficulties in analyzing our industry some few years ago, when we now take a retrospective view of the present industry, it is indeed a gratifying pleasure that may well make the National Pest Control Association proud of its accomplishment and progress since the organization first came into existance. Now, as a highly recognized profession of Pest Control Operators, or in short, PCO's, we have much of which to be proud. By far the most important movement thus far advanced that reflects the importance of our National Association is the movement toward **professionalism.** Begun during the NRA period, the movement has gained momentum, and is now leading all PCO's to realize the paramount importance of their relationship to the public in rendering tomorrow's service a better one than that of former days.

The reason for this strong professional attitude, stems from the standard that our National Association has set for the industry. In realizing the essentiality of these high standards, the organization endeavors to render the type of service that the public demands.

Now that the war is supposed to be over, and new insecticides are playing a vital part in the extermination of various insects, naturally, a new competitive force will be felt; but experienced PCO's will have to fight such force with the best weapon at their command. By far the greatest weapon to combat this competitive force will be the professional training that PCO's receive from the various Conference meetings that are now being held throughout the country. Such conferences play a vital and important part in the training of every PCO, to sell and do a better job—one that will be a credit to any PCO firm.

Speaking of these Conference meetings, let's not overlook the fact should there be any who may consider such meetings to be only for beginners that the best and ablest and most successful PCO's in the field do not accept such an erroneous idea. A few who may have been in business for many years may feel that they do not need any more training, but the majority attend these meetings, realizing the paramount importance of up to the minute knowledge.

Let no PCO delude himself into thinking that he can survive successfully without considering the enlightened public that desires the kind of modern service it wants.

Remember, the public expects tomorrow's PCO service to be better than that of the past.

Ordinance Enforcement

THE THREAT of government intervention in matters of rodent-control service has been a source of growing anxiety to the Industry for sometime now. For that reason a recent news item, instancing an enforcement of the Memphis (Tenn.) rodent-control ordinance and striking an ameliorative note, is of relevant interest.

Briefly outlined, the item recites the fining of a Memphis firm for failure to effect certain ratproofing on its premises, this despite several notices from inspectors in the Typhus Control Service of the Health Department to do so.

There is much to be said in favor of the kind of ordinance enforcement just noted, in that Health Department activities are directly limited to the essentials of inspection and "must-do" notices to the property owner or occupant. Actual ratproofing or exterminating is, however, done by the property owner, utilizing trained persons, such as the PCO or the contractor, among others.

This brings up the question:

What About Rodent-Control Crews?

Elsewhere, in contradistinction to the foregoing, every manner of high pressure is being brought to bear to set up rodent-control crews, operating all-year-round and salaried out of public funds, to do actual baiting and ratproofing, with costs for such services charged to the property owner or occupant. Yet, at the same time, no serious effort is being made to do anything about the terrible insanitary conditions that exist in many cities, especially in connection with garbage removal, without which, of course, there can be no rodent control of genuine substance.

To the extent that government-employed crews do inspector-initiated baiting and ratproofing—the single-procedure type of crew, incidentally, is not under discussion here—they supersede and conflict with private enterprise. On the other hand, to be sure, the Industry can do much to set its own house in order, as it has already started to do, by formulating a well-integrated rodent-control plan of its own—a plan which will not only enlist public co-operation but elicit recognition by government agencies as well.

Once this course is made a practical reality—a course that is on the highest constructive level—there's not much doubt, we are convinced, the Industry can contain if not neutralize not only the need but the agitation for the government-sponsored crew.

Technical Aids

ATTENTION is directed to one important source of technical "know-how" sometimes overlooked by the PCO: the manufacturer himself. His research files are replete with constructive technical aids, geared to minimizing accident hazards and resolving rodent-or insect-infestation problems. Moreover, his research staff is always available for consultation, without obligation.

For these reasons, and because of the advent of new-type insecticides and rodenticides, as well as continued large-scale use of fumigants and other poisonous chemicals by the Industry, it is more imperative than ever not only that the manufacturer but that all other research facilities be utilized.

The Sixth Annual Southern PCO Conference

TRADE LUMINARIES and technical experts from kindred groups will headline the first post-war but Sixth Annual Southern PCO Conference, to be held at Louisiana State University, Baton Rouge, La., February 14, 15, 16, 1946. Since several southern states are planning large representations, a record-breaking attendance is expected.

If you are a PCO or have any other professional interest in pest control, you are most welcome to attend. There are no attendance restrictions, whatsoever, and that includes retention of membership in any national, state or local association.

Discussions will be keyed to the practical, Prof. O. W. Rosewall states, and centered around new chemicals, techniques of application and current developments. That you may be more specifically informed of the nature of the program planned, a cross-section of some of its highlights follows:

1. Fumigations: From reports received during the year, it is evident many questions apropos efficiency and safety in fumigations remain to be answered. Fumigation experts will make every effort to bring you up to date, clarifying many of the troublesome problems.

2. Rodenticides:
   (a) "1080": What it is, its color, its power as a rodenticide and why it is being made available for the PCO and what must be done if the PCO is to continue to have the privilege of using it.
   (b) Antu: Its efficiency as a rodenticide; its outstanding advantages.

3. Argentine Ant and the other species of ants: A constant problem in the south.

4. Cockroach: New methods of control; DDT and roach control. Various species of economic importance in the south.

5. Sanitation: Its importance in the destruction of rats and how various Health Board rulings affect the PCO.

Registration fee is $6.00. This will provide you with a copy of the "Conference Manual" and a ticket for the banquet scheduled for Thursday evening, February 14 at 7:30 p.m. "Informational Registration" form appended below should be filled out and sent as directed therein, including a check in the amount of $6.00, made out to L. S. Bridges, Treasurer.

Registration will take place on Thursday morning, 8:30 o'clock, February 14 in Room 102, Audubon Hall, Louisiana State University.

Travelling: You're on your own, but please try to be on time so as to gain full benefits. Many, it is expected, will arrive Wednesday, February 13.

The hotel situation still being "difficult", prospective conferees are urged to double up, with prompt reservations made at any of the following hotels:

HEIDELBERG HOTEL, Baton Rouge, La.
Single: $2.75; $3.25; $3.75; $4.25, and $5.25.
Double: $3.75; $4.75; $5.00; $5.50; $6.25 and $7.50.
Twin Beds: $5.00; $6.00; $7.50; (All rooms with bath).

KING HOTEL, Baton Rouge, La.
Single without bath: $1.75; with bath $2.25.
Double without bath: $2.50; with bath $3.25.

ISTROUMA HOTEL, Baton Rouge, La.
Single without bath: $1.50; with bath $2.00 and $2.50.
Double without bath: $2.50; with bath $3.00 and $3.50.
Connecting bath—Single $1.75; Double $2.75.

For those who prefer them, there are several new large up-to-date tourist camps near the city.

Good meals at reasonable prices may be secured at the Louisiana State University cafeteria. Busses from hotels in Baton Rouge to the "University" run on a 15-minute headway.

Important

"Informational Registration" form subjoined should be filled out and forwarded immediately to Prof. O. W. Rosewall, Department of Zoology and Entomology, Louisiana State University, Baton Rouge 3, La. In doing so you will find ready for you a copy of the "Conference Manual" containing much information of value. Moreover, please do not neglect to answer the last question on the form in order that the program planners can be of the greatest service in meeting your problems.

INFORMATIONAL REGISTRATION
Sixth Annual
SOUTHERN PEST CONTROL OPERATORS' CONFERENCE
February 14, 15, 16, 1946
Louisiana State University, Baton Rouge, Louisiana

Name: .....

Address: .....

City and State: .....

Firm Connected With: .....

.....

Do you expect to attend Conference? .....

Will you attend the entire Conference? .....

Registration fee $6:00 (Check made out to L. S. Bridges, Treas.)

Enclosed: ☐ Will pay on arrival: ☐

REMARKS: (Would appreciate your submitting any Questions or Problems as well as indicating any special subject matter you feel should be emphasized.)

PLEASE ANSWER THE FOLLOWING:
What was your most important Pest Control Problem during the past year?

(Please send this form directly to Prof. O. W. Rosewall, Dept. Zoology & Entomology, Louisiana State University, Baton Rouge 3, La., as soon as possible.)

Fourth Annual Canadian Pest Control Operators Conference at University of Montreal

February 18, 19, 20

WITH AN EYE on the actual needs of the Pest Control Operators, the University of Montreal in cooperation with the Canadian Pest Control Operators Association is preparing its fourth consecutive annual Conference.

This Conference is opened to all pest control operators whether or not they belong to any Association. The University of Montreal is only glad of this opportunity to cooperate in making for more scientific and sounder pest control.

Notes on the Program

New chemicals are constantly being offered to the pest control operators. Claims of one kind or another are being made for these chemicals and it is becoming more and more important for a pest control operator to understand what he reads in his trade journals as well as in the manufacturers' literature. The first day of the Conference will give the pest control operators an opportunity to brush up on basic notions in chemistry. For this purpose, we have secured the good services of chemists and physiologists who, with the help of men from the industry, will discuss for us:

1. Definitions of terms used in connection with chemicals;
2. Chemical properties of DDT, DDD, 666, 1080, Antu, etc.;
3. Physical properties of the same chemicals (solvents, emulsifiers, dust diluents and related problems).

The Monday session will wind up in a report from the Research Projects Committee with recommendations on the use and limitations of DDT. Open discussions will follow.

Of particular interest to all is the fact that there will be very little talk and a great deal of demonstrations. That is, we shall attempt to actually demonstrate by actual laboratory experiments what the chemical terms mean. For instance, instead of going into lengthy discussions in order to explain the term "synthetic chemical", there will be shown, greatly magnified, models of molecular chains of the new chemicals such as DDT, DDD, etc., and such chemicals will be synthetized or prepared right then and there. Likewise, in order to have such terms as "physiological effects" or "pathological effects" better understood by the class, demonstrations will be made with live animals such as rabbits or rats.

The Tuesday morning session will be given over to "Safety" in pest control and there will be discussed the precautions which should be taken in handling fumigants and other toxicants such as the new synthetic insecticides. New safety items will be shown and kits containing materials required to combat the action of poisons will be displayed.

The afternoon session will be a "Rodenticide Clinic". The value of various types of baits and poisons will be discussed. Aside from demonstrations of bait mixing, actual chemical analysis will be made of samples of poison baits chosen at random in order to demonstrate how well or how poorly the poisons have been mixed into the baits. Some of our members have volunteered to discuss their own rat control methods with the class. Needless to say that the new raticides, "1080" and "Antu" will come in for discussion. Another item of interest which will be dealt with is "Dead Rat Odors" and what to do about them.

Father Fournier will take charge of the Wednesday morning session with a short course on insect identification. The main feature of this course will be a laboratory session where the class will be given a number of specimens to identify.

The last Conference session, on Wednesday afternoon, will afford an occasion for discussing new fields of application for pest control services and we are keeping some free time for answering and trying to solve problems submitted by those in attendance.

Annual Business Session and Social Activities

The Annual Business Session of the Canadian Pest Control Operators Association will take place on Thursday, February 21st in Salon "E" of the Windsor Hotel. Following the reports of the Officers and Committee Chairmen for the year 1945, the new Officers will be elected and plans for the coming year will be discussed.

There will be ample time for informal gatherings and chats between members, first at the Sunday Dinner, then at the Tuesday night Reception and at the Wednesday evening Banquet, without mentioning meal-time during the Conference and time between sessions.

SUMMARIZING THE PROGRAM:

SUNDAY, February 17th:
6:00 P.M. Salon "E" Windsor Hotel: Advanced Registration;
7:30 P.M., dinner served in Salon "E" at the regular hotel rates open to all who have already come into Montreal.

MONDAY, February 18th:
9:00 A.M., University of Montreal: registration;
Three Conference sessions taking all of the morning, afternoon and evening.

TUESDAY, February 19th:
9:00 A.M. and 2:00 P.M., Conference sessions at the University of Montreal;
8:30 P.M., Reception at the Windsor Hotel, Prince of Wales Salon; all invited: members, guests and the ladies.

WEDNESDAY, February 20th:
9:00 A.M. and 2:00 P.M., Conference sessions at the University of Montreal;
7:30 P.M., Annual Banquet at the Windsor Hotel, Prince of Wales Salon, guest speaker: Theodore Oser, President, National Pest Control Association.

THURSDAY, February 21st:
9:00 A.M., Salon "E" of the Windsor Hotel, Annual Business Meeting of the Canadian Pest Control Operators Association.

LADIES' PROGRAM

Although no special registration fee is going to be asked of the ladies who will come along, a program will be offered to them to take in a tour to the famed St. Joseph Oratory and the Wax Museum and finally the Dietetics Department of the University of Montreal where tea will be served. Another afternoon will see the ladies on a shopping tour through shops which are bound to appeal to our visitors.

REGISTRATION FEE

The twelve dollars and fifty cents ($12.50) Registration Fee will cover the cost of the Conference Manual, the Reception, the

Banquet and other miscellaneous items. All meals during the Conference may be had at the University Cafeteria at a nominal cost.

Those who may not be able to attend and who wish to secure the Conference Manual should send their order to E. R. Bellemare, University of Montreal, 2900 Mount Royal Boulevard, Montreal 26, Que., Canada, together with their cheque in the amount of three dollars ($3.00).

(All cheques to the order of E. R. Bellemare and payable at par in Montreal.)

HOTEL RESERVATIONS

WINDSOR HOTEL, 1160 Peel Street, Montreal, Que.

Single (no bath)	$2.75
Single (with bath)	4.50 up
Double bed (no bath)	4.50 up
Double bed (with bath)	6.50 up
Twin beds (with bath)	6.50 up

FORD HOTEL, 1425 West, Dorchester Street, Montreal, Que.

Single (no bath)	$1.50
Single (with bath)	2.50
Double bed (no bath)	2.50
Double bed (with bath)	4.00
Twin beds (with bath)	5.00

QUEENS HOTEL, 700 Windsor Street, Montreal, Que.

Single (no bath)	$2.00
Single (with bath)	3.00 up
Double bed (no bath)	3.50 up
Double bed (with bath)	5.00
Twin beds (with bath)	6.00

DE LA SALLE HOTEL, 1240 Drummond Street, Montreal, Que.

Single (with bath)	$3.00 up
Double (with bath)	4.00 up

MOUNT ROYAL HOTEL, 1455 Peel Street, Montreal, Que.

Single (with bath)	$3.85 up
Double bed (with bath)	6.50 up
Twin beds (with bath)	6.50 up

RITZ CARLTON HOTEL, 1228 West, Sherbrooke Street, Montreal, Que.

Single (with bath)	$5.00
Twin beds (with bath)	$8.00-10.00

Hotel accommodations are still difficult to secure in Montreal. Therefore, we would ask that you write or wire without delay and directly to the Hotel manager of your choice and request a confirmation of your reservations. If in a pinch, you may communicate with Jack Rudick (Western Exterminating Co., 2449 West, Notre Dame Street, Montreal 3, Que.) who has again volunteered to help by applying pressure on some of the local Hotel managers on behalf of our visitors. Nevertheless may we suggest that you act promptly and try to deal directly with the Hotel managers.

We are looking forward to meeting again all of our old friends and to making new ones at this coming Conference, our best yet, we feel sure, at the University of Montreal, February 18 to 21st.

E. R. Bellemare, for the University of Montreal.
C. E. Ryder, President, for the Canadian Pest Control Operators Association.

"So Deep are the Roots of Appreciation"

Text of Charles Pomerantz's address before Annual Dinner of the Professional Exterminators Association, N. Y., Hotel Brewster, N. Y., December 10, 1945, at which William O. Buettner was the honored guest.

WE ARE gathered here tonight to honor a man—a man whose rare talent, dynamic energy and uncommon idealism have played and are playing such a vital role in the daily lives of us all.

Many of us in the course of our lives are the recipients of much good. At first, we are moved to admiration even to appreciation, of our good fortune. Then, as our good fortune continues, we begin to look upon our bountiful privilege as a sacrosanct right—a right which imposes no corresponding obligation.

We have just passed a crucial period. Three and a half years of war was our unwanted lot. Some industries shut down; many businesses, both large and small, found themselves unable to operate because of lack of materials and manpower. As a result some owners sought new jobs, others new ways of life—some even new homes in far-away states.

Now, thank God, the war is over. The needs that we as PCO's experienced in men and materials are about to end. Now, while the fires of war are, I hope, extinguished forever, we are brought to think back to those trying years and to a man whose genius and inspirational leadership led our ship safely through those rough and dangerous waters of war. Like a modern King David he has guided—chastised—and helped us.

He gave of himself selflessly, without regard to his physical or to his financial well being. All this to the end, that the pest control profession has become a completely integrated one, enabling it not only to exist, to learn, and to prosper but, above all, to further the war effort.

I quote, "And King David escaped unto the Cave Adulum and all those who were in want, and all those who were in distress came there unto him."

So did we come to "Bill" when in want and in distress.

It is then with a sense of vaulting pride that we members of the Professional Exterminators Association, little men with big hearts, have gathered here tonight to pay homage to William O. Buettner, the man, the idealist, the inspirational leader, the crusader in our midst.

The activities of this man during those hard years were of such momentous significance to the life and well-being of the members of our profession and their business, that it, at once, is blazoned upon each and every one of our hearts. We are humbled at the thought of our good fortune to have within the ranks of our profession such a man. Before the war years and during the war, he administered and now during the post-war period, he still administers the affairs of the NPCA in a manner that places him without a peer among men, helps local organizations to get on their feet, extends a ready hand of friendship and help to anyone in our profession who comes to him, member or non-member. His is a wisdom and daring that requires uncommon talent and a heart and an idealism that is not found amongst many mortal men.

To drive the thoughts home, let us now pay a visit to his office, The Modern Cave Adulum of this modern David.

Bill is dictating letters. To whom do you suppose? To clients of his? No—to the Department of Entomology, to the Fish & Wildlife Service, to a Draft Board, to a chemical house and to many other places and institutions. For whose benefit? For yours and mine. It takes time and energy. A service letter dictated into a dictaphone at 2 P.M. on DDT—materials—equipment—manpower—fumigator practices—and what not. The telephone rings. Calls are coming in from North, South, East and West of this good land of ours. They are whirlwinds of octaves of demands and inquiries. Bill, I am badly in need of this or that. This PCO's man is essential and unless he gets a reclassification, the business is in danger. Bill gets on the job at once. Pathos of expression from a careless fumigator, "What shall I do now, Bill?" The Economic Entomologists are bent upon recommending laws to govern the activities of our pest control profession. Bill drops his work, goes out of town to take a hand. He gets word that a Board of Health is considering some well-intentioned but ill-advised regulation which may not be in the best interest of either the public or the PCO. Bill is on the way to the Board of Health. A certain state is about to pass some unjust law in relation to the pest control activities. Bill flies to that state even though his own business needs him.

And as this is not enough to keep him busy with your and my troubles, he spent two to three days a week in Washington, as our representative on a vital war committee. He fought to obtain much needed materials. He fought in our behalf. The men in control of various government boards heard and listened to him and to his requests. This effervescent spirit, indefatigable worker's voice with deep and sustained breath of honesty and sincerity was listened to and respected, with results known to all of us. Through his valiant efforts Pest Control was declared an essential industry.

Not only has he spent great amounts of time in his office working for all of us, but in the past fiscal year, he has spent 111 days in various parts of the country including Washington, D.C. on our behalf; and with no financial benefit to himself whatever. Who among us was not benefited by his work and what a challenge to any man.

Other men who head trade associations, do not accomplish half of the good that is accomplished by Bill's free labor of love; yet they command salaries which would rouse anybody's envy.

How to begin to repay this man for all the good he has made possible, presents a difficult problem. To give expression in terms of tangible values is no answer, for he would be the last to accept and the first to disown it. Moreover, we have not the means, only the spirit—a spirit which impels us to say to you, "Bill, deep down in our hearts are the roots of our sense of gratitude for your inspired leadership, your simple straight forward and unpretentious manner, your display of affection for us, your thunder at our wrong doings."

We want you to leave this gathering tonight with the knowledge that we, as a group, through our busy day in the pursuit of our daily bread and duties are not unmindful of what you have done for us in the past and are doing now.

So, we little men, in whose hearts lie deep the roots of appreciation, utter this hope—that Health and Happiness for you and those who are near and dear to you, be your daily lot, that whatever you do in our behalf may come back to you a hundredfold.

Summary of DDT Experiments on Insects 1* That Affect Man and Animals

By **W. E. DOVE**
Division of Insects Affecting Man and Animals

THE DEVELOPMENT of DDT insecticides at Orlando, Fla., and their use by the armed forces since 1943, as well as tests made by other workers of the Bureau of Entomology and Plant Quarantine and its cooperators, have demonstrated that practical control of certain insect pests of man and animals may be obtained with these insecticides. The experimental work at Orlando was conducted under a transfer of funds, recommended by the Committee on Medical Research, from the Office of Scientific Research and Development, and the results were made available to the armed forces in various reports.

The present report is based on information gained from tests made under conditions found in civilian life by workers in the Division of Insects Affecting Man and Animals, in some cases with the cooperation of other agencies. Many of these tests were suggested by the findings of the Orlando group. It should be understood that many of the tests were seasonal or regional in nature, and that no recommendations for the practical use of DDT insecticides against any of the insects are included in this report.

Body Louse

At Orlando it was found that a concentration of 0.25 percent of DDT in diluents such as talc or pyrophyllite will give complete kill of the body louse (**Pediculus humanus corporis** Deg.) when applied to infested clothing. This concentration is too low, however, to give lasting effects. When an individual's clothing is treated at the rate of 1 ounce of a powder containing 5 percent of DDT, the powder is effective for 10 to 14 days. When the same amount of a 10-percent powder is applied, protection against reinfestation lasts for approximately 21 days. Since the incubation period of louse eggs seldom exceeds 21 days, a single application of the powder will eradicate an infestation. DDT has no ovicidal properties; however, the newly hatched lice are killed by the DDT residue.

Two methods of impregnating clothing have been developed. One method consists in dipping garments in a volatile solvent containing DDT. A dry-cleaning fluid such as Stoddard's solvent, or a light petroleum fraction such as gasoline, was found to be suitable for this purpose. Another method, designed especially for use in the field, consists in dipping garments in an emulsion of DDT. When either method is employed, the clothing is wrung out and then dried. Both methods are equally effective.

Head Louse

DDT was just as toxic to the head louse (**Pediculus humanus humanus** L.) as to the body louse. Because it was combed from the hair, two applications of the 10-percent DDT powder, about 10 days apart, were applied. The second application killed the newly hatched lice before they were old enough to lay eggs. In practical tests on a large scale a single treatment with a 10-percent powder gave complete control in almost all instances.

Crab Louse

The 10-percent DDT louse powder was used against the crab louse (**Phthirus pubis** (L.)). Two applications made at intervals of 10 days were completely effective in a large number of tests.

Cattle Lice

At Dallas, Tex., R. W. Wells and W. T. Hunt found that louse powder containing 10 percent of DDT killed the motile stages of the short-nosed cattle louse (**Haematopinus eurysternus** Nitz.), the long-nosed bloodsucking louse (**Linognathus vituli** (L)), and the cattle biting-louse (**Bovicola bovis** (Nitz.)). A single treatment applied to only a portion of the body was not sufficient for killing all lice on the animal. Dipping of cattle was more effective than dusting or spraying. The short-nosed louse succumbed to a dip containing 0.08 percent of DDT in a soluble-pine-oil emulsion, but not all the long-nosed lice were killed by this concentration. A single treatment with a dip containing 0.2 percent of DDT eliminated infestations of both the long-nosed bloodsucking louse and the short-nosed cattle louse.

Goat Lice

At Menard, Tex., H. E. Parish and C. S. Rude found that a dip application of 0.2 percent DDT in soluble-pine-oil emulsion, in which 2 quarts of the liquid adhered to each animal, gave complete control of all stages of the four species of lice that occur on goats in that section. The dip left in the vat was effective against motile stages of red and yellow biting lice (**Trichodectes** sp.) and the blue bloodsucking lice (**Linognathus** sp.) on goats for more than 99 days after it was first used. Following these preliminary tests herds of goats were treated with the same formula, and it now appears that lice may be eliminated on a ranch if every animal is dipped and no infested ones are permitted on the premises.

Goats dipped in a soluble-pine-oil emulsion containing 0.1 percent of DDT were sheared 5 days later, and all motile lice were found to be dead. At Beltsville, Md., E. A. Back exposed the mohair clipped from the animals to larvae of the carpet beetles **Attagenus piceus** (Oliv.) and **Anthrnus vorax** (Waterh.). Approximately 3 months later about eight-ninths of the larvae on the treated material had died and the others appeared sluggish and starved. Larvae kept on untreated mohair were alive and appeared healthy. The results of this and similar tests suggest that the 0.1 percent DDT dip may impart to mohair a good resistance against hungry larvae for a storage period of 3 months or longer.

Hog Lice

In Georgia and Florida W. G. Bruce and A. L. Smith found that a soluble-pine-oil emulsion containing 0.2 percent of DDT was effective in killing motile stages of a hog louse, **Haematopinus adventicius** Newm. Spray applications were effective during the first week, but not for 13 days after treatment.

Owing to the hogs' habit of bedding together, the treated hogs rapidly reduced the infestation among all the hogs present. Two treatments with 0.2 percent of DDT emulsion eliminated all the lice.

Poultry Lice

At Menard, Tex., H. E. Parish found that the dusting of individual hens with a shaker can containing 5 percent of DDT in pyrophyllite freed them of lice. Whether the material can be applied safely in a dust, spray, or aerosol to poultry in houses is not known. Its toxicity to fowls must be determined before large-scale tests are undertaken.

Mosquitoes

Tests made with liquefied-gas aerosols against **Anopheles quadrimaculatus** Say show that pyrethrum is more effective than DDT, in both knock-down and kill. DDT, however, causes a high kill of mosquitoes when used at concentrations effective against flies, and its use in combination with pyrethrum allows about a 25-percent reduction in the amount of pyrethrum without loss in killing power. On the basis of these tests the following formula has been used (figures in percent): Pyrethrins 0.4, DDT 3, cyclohexanone 5, motor oil 5, and dichlorodifluoromethane 86.6. The formula is about equally effective against flies and mosquitoes.

A DDT-pyrethrum spray can be finely dispersed mechanically and is equally as effective as the liquefied-gas aerosols. An effective concentrated-spray formulation is DDT 20, pyrethrins 3, cyclohexanone 20, motor oil 5, and kerosene 52 percent.

J. B. Gahan applied DDT sprays that left a residue on the inside walls and ceilings of residences, barns, and poultry houses in two 9-square-mile areas near Stuttgart, Ark. In one area an average dosage of 56 mg. of DDT per square foot reduced the number of **A. quadrimaculatus** 91 percent in 3½ to 4½ months. In the other area an average rate of 208 mg. of DDT per square foot reduced such mosquitoes 99 percent during the same period.

Tests with DDT in the laboratory at Orlando, Fla., showed that DDT was effective but less toxic to larvae of **Culex quinquefasciatus** Say and **Aedes aegypti** (L.) than to comparable larvae of **Anopheles quadrimaculatus.** In field tests in Florida dusts applied at the rate of 0.1 and 0.05 pound of DDT in talc per acre gave complete or near complete control of **A. quadrimaculatus** and **A. crucians** Wied. Dosages of 1 to 2 pounds of DDT per acre, in areas having a uniform growth of vegetation, prevented all but negligible larval development for 4 to 8 weeks. On account of the shifting of surface films by winds, a minimum killing dose of 0.1 pound of DDT per acre appeared preferable to the larger dosages for routine applications.

Oil solutions containing 5 percent of DDT (weight per volume), applied at the same rates as the dusts, were also effective for the same species provided adequate coverage of the breeding areas was obtained. Finely atomized sprays produced by paint-type spray equipment, or from airplanes using equipment developed by C. N. Husman and O. M. Longocy at Orlando, were satisfactory for this purpose. When applied as a fine spray to the breeding areas, an emulsion containing DDT 20, Triton X-100 (an aralkyl polyether alcohol) 20, and xylene 60 percent by weight, and used at the rate of 0.1 pound of DDT per acre, was equally as effective as the same amount of DDT applied in oils. In stabilized pools where emulsions were mixed with the water at the rate of 1 part of DDT to 1 million parts of water, the breeding of **Anopheles** mosquitoes was prevented for 4 weeks or longer. When emulsions were applied in the same manner against culicine mosquitoes, somewhat higher dosages were found necessary for **Aedes** and **Culex** species than for **Anopheles quadrimaculatus.**

Black Flies

In the Upper Peninsula of Michigan, Ray Hutson reports that golf players were protected from the black fly **Simulium venustum** Say through the application of

dusts containing 1 percent of DDT. The material was applied with a hand dust gun to golf greens and tees at the rate of about 15 pounds per acre. Bushes and shrubs were also dusted liberally. The premises were kept practically free of flies for approximately a week.

Deer Flies

In preliminary tests in Oregon by C. M. Gjullin and D. Mote, dusts and sprays containing DDT were unsatisfactory when used on wet soil that contained larvae and pupae of deer flies (**Chrysops** spp.). The adult flies emerged from the puparia on the top layer of mud, and thus there was no opportunity for them to come into contact with the insecticidal treatment of the soil.

Applications of concentrated emulsions and oils containing DDT to the ears of cattle did not prevent engorgement of blood by the flies on the treated ears. The flies lived about 12 hours after engorgement.

Filter Flies

In Wisconsin L. F. Warrick killed adult filter flies (Psychodidae) with a residual spray (see Houseflies, p. 6) containing 2.75 ounces of DDT in a gallon of kerosene, applied at the rate of 1.1 gallons per 1,000 square feet on the side walls of a sewage-filtration plant. As the flies emerged from the scum on the surface of the water, they rested on the treated walls and were killed. The habit of resting on walls near their breeding and feeding places makes filter flies vulnerable to residual treatments of DDT sprays.

Two days after the sludge beds of a sewage disposal plant had been sprayed with 7 ounces of DDT in 50 gallons of kerosene, many dead maggots could be seen in the cracks in the beds, but smaller numbers were also found in the check beds where only kerosene had been used. Five days after treatment the maggots could be found only in the lower ½ to 1 inch of sludge, in the DDT-treated area. In the check area numerous maggots were working throughout the entire depth of sludge. Twelve days after treatment no fly larvae could be found in the DDT-treated area. Few puparia were found, and they were present only near the bottom of the sludge. In the check area, treated with kerosene only, many puparia and active larvae were found and many flies had emerged. The operator of the plant reported that the filter fly nuisance in his house and in the laboratory had been greatly relieved.

Horn Flies

At Dallas, Tex., E. W. Laake reported 37 tests in which DDT sprays made of emulsions or water-dispersible powders (micronized materials that are easily dissolved in a suitable wetting agent) had been applied to herds of dairy and beef cattle for the control of horn flies (**Siphona irritans** L.). With a dosage of DDT ranging from 0.67 to 1.4 grams per animal satisfactory control was obtained for 5 to 7 days. When three-fourths as much DDT was used the control was of shorter duration, and when one-half as much DDT was used the results were unsatisfactory. Sprays containing emulsions in xylene or in pine oil, applied at the rate of 4 or 5 grams of DDT per animal, gave excellent control for 14 to 18 days.

In Kansas, Texas, and Florida a 2.5-percent DDT spray, made of water-dispersible 50-percent DDT, was effectively applied to range and dairy animals with power sprayers. One application to the backs and bellies of the animals in chutes or corrals remained almost completely effective for 10 to 15 days and a second application for 2 to 3 weeks. In general the tests indicated that the period of protection depends upon the quantity of DDT applied to the animal rather than upon the volume of the spray or the kind of equipment used. With the methods and materials used, satisfactory control for 10 to 15 days or more was not obtained with less than 4 to 5 grams of DDT per animal.

E. W. Laake also reported that a herd of 250 purebred Herefords were dipped in a xylene-soluble pine oil emulsion containing 0.12 percent of DDT. The herd averaged 4,000 flies per animal, but 2 hours after dipping, and for 48 hours, the herd was entirely free of horn flies. Observations on the 4th, 6th, 9th, 11th, and 14th days after dipping showed an average infestation per animal of 1.5, 3.8, 3.4, 5.9 (all afternoon observations), and 0.1 (morning observation) flies, respectively. During this period (2 weeks) no reduction of the horn fly infestation on check herds in the neighborhood was observed. Another treatment was made with the same dip 14 days after the first dipping. The two treatments gave almost complete control for at least 2 months, whereas untreated animals on neighboring ranches carried from 50 to 1,000 flies during this period.

In Florida W. G. Bruce reported that effective control of horn flies was obtained for more than 2 weeks with dips containing 0.2 percent of DDT, as well as with sprays containing 2 percent of DDT, an emulsion being used in both cases.

Houseflies

DDT was used effectively in sprays for treating favorable resting places of houseflies (**Musca domestica** L.). When the sprayed surfaces became dry, the toxic DDT deposits that remained continued to kill flies and other insects that alighted or walked upon them. These deposits were effective for several weeks or months, depending upon the kind of spray used and the length of time the sprayed surface was exposed to direct sunlight or water. Because this method of applying sprays differs from the direct applications of sprays against insects, the term "residual spray" is employed to differentiate it from a "space spray," the kind of spray ordinarily applied in the air as a fog or mist. The DDT residual sprays found most practical to date are suspensions of 2.5 percent of DDT from water-dispersible powders, 5 percent in kerosene, or 5-percent emulsions prepared by diluting concentrates containing 25 percent of DDT, 65 percent of xylene, and 10 percent of Triton X-100.

Kerosene sprays.—Flies percent of DDT in kerosene (7 oz. in 1 gal.) has been used effectively under a wide variety of conditions during the past 2 years. It has been sprayed on favorable resting places for flies in dairy barns at Beltsville, Md., at several locations in Florida, in South Dakota, and in eastern Montana. It has been applied to walls in dining rooms and on walls and screens of residences in several States. A single treatment at the rate of 1 gallon to 1,000 square feet of surface (about 200 mg. of DDT per square foot) was effective throughout the season. Some treatments were 95 percent effective for 4 months and continued to kill houseflies for 10 months. Where the breeding places were neglected, flies emerged faster than they were killed in the treated rooms. This is attributed to the fact that 1 to 4 hours is required for killing the flies. It is therefore possible for the newly emerged flies to become annoying in treated buildings. Such occurrences emphasize the need for controlling the breeding places of houseflies.

Horse stalls in Indiana and Florida and dog kennels in Florida sprayed with this solution gave a high degree

of protection to man and animals from annoyance by houseflies and also from bites of stable-flies.

The use of residual sprays only about the entrances of kitchens, restaurants, creameries, hospitals, cheese factories, meat-packing establishments, and a camp for cherry pickers gave considerable control for more than 2 months.

When the DDT-kerosene spray was applied to 150 square feet of a shaded corrugated-metal siding of a building between a milk house and a cooling room, it killed flies throughout the season, but the effectiveness decreased by the end of the seventh week.

In some instances the spraying of unpainted wood, concrete, brick, and plaster surfaces with kerosene containing DDT was not effective in forming a residue for killing flies. It appeared that such walls absorbed the DDT.

Emulsion sprays.—At Beltsville, Md., L. S. Henderson sprayed concrete barns with 2 percent of DDT in xylene emulsion, at the rate of 200 mg. of DDT per square foot. This treatment provided surfaces which killed flies for 1 month. When similar barns were sprayed with a 1-percent emulsion, at the rate of 125 mg. per square foot, the treated surfaces killed flies for 2 weeks and then became less efficient. In several practical tests sprays containing 5 percent DDT-xylene emulsions were effective on metal walls and on old painted surfaces, but there was some objection to the white deposits on dark-colored surfaces.

Water-dispersible powder sprays.—The water-dispersible powders recently developed by different manufacturers are considered suitable for spraying porous walls and ceilngs of barns, stalls, and poultry houses. They leave white residues on the treated surfaces, but do not appear objectionable on whitewashed or white-painted walls of outbuildings. In the tests conducted so far the water-dispersible sprays on walls of a porous nature appear equally as efficient as the DDT-kerosene sprays of the same concentrations on smooth surfaces. On concrete walls applications of 100 mg. of DDT per square foot gave excellent control of houseflies throughout the season.

Dusts.—Dusts containing 10 percent of DDT, applied with a hand duster in barns just before the cows were milked, killed the flies present, but there was no noticeable protection a day or two after this treatment.

Ceiling streamers.—Streamers made of cloth and treated with a 5- or 20-percent DDT emulsion killed flies that alighted on them, but they were not preferred by the flies as resting places. In dairy barns in eastern Montana, when treated strips of cheesecloth were used, there was no noticeable reduction of the housefly population, and it was necessary to resort to other means of control.

Sandflies

Sprays containing 5 percent of DDT in kerosene were applied by W. G. Bruce to screens of residences at New Smyrna Beach, Fla., for control of sandflies (**Culicoides** spp.). Numbers of the flies died shortly after they passed through the meshes of the screen and before they were able to take a meal of blood. Protection was obtained also from 10-percent DDT powder applied on the clothing that was worn about salt marshes. The powder probably gave less protection than a spray containing an insect repellent such as dimethyl phthalate or the mixture used by the armed forces.

Dog Flies or Stableflies

Bay-water emulsions of both DDT and DDT residual oil, applied by S. W. Simmons and E. B. Blakeslee as light surface sprays to infested marine-grass deposits along the shores of inner bays of northwestern Florida, effectively controlled breeding of the dog fly (**Stomoxys calcitrans** L.), also called the stablefly. The treatments did not penetrate the grass to kill the immature stages, but the adult flies that walked upon the treated surfaces were killed. Plot tests of comparative toxicity showed DDT to be about four or five times as lethal as the residual oil.

When applied to marine-grass deposits at a concentration of 0.5 percent for DDT, or 2.5 to 3 percent for DDT residual oil (contains about 22 percent of P.P²-DDT), at the rate of 2 gallons per 100 square feet, 90 to 95 percent of emerging flies were killed. On infested grass treated and subjected to tidal action, 60 percent control was obtained when results were compared with those obtained on a similar untreated plot. The treatment plus the effects of the tide provided 90 percent control of the fly breeding. Uninfested grass treated with these sprays has shown complete protection against infestation for the period it is susceptible to fly breeding.

Approximately 41 miles of grass distributed along 75 miles of shoreline were treated by E. B. Blakeslee, in cooperation with K. D. Quarterman, with either DDT or a DDT residual oil. A total of 7,545 gallons of diluted spray were applied at an average rate of approximately 180 gallons per mile of grass. The observations suggest that new deposits of grass accumulate within 2 weeks, and these should be treated in order to prevent flies from developing in the new accumulations.

In different localities spray applications of emulsions containing 5 percent or less of DDT to cattle, horses, and dogs did not provide any immediate protection against stableflies. The flies gorged themselves on the treated surfaces, and most of them died within a few hours after feeding. Protection of animals was obtained from treatments of walls and ceilings of barns and stables, as described for tests with houseflies. These treatments were equally effective for both species of flies.

Soldier Flies

Sprays containing 5 percent of DDT and dusts containing 10 percent of this chemical were applied to pits of latrines and found to be ineffective against larvae of the soldier fly **Hermetia illucens** (L.). Screens treated with the spray killed adult flies that walked over them.

Screwworms

A smear containing 20 percent of DDT and a dust containing 10 percent of DDT were used by H. E. Parish for treating wounds of 20 sheep infested with 5-day-old screwworms (**Cochliomyia americana** C. and P.). The animals suffered no ill effects, and the average period required for healing was 34 days. Both the smear and the powder protected the wounds against reinfestation for 21 days. After both treatments reinfestation occurred in half the wounds, whereas in sheep treated with smear 62 (containing diphenylamine) only 40 percent of the wounds were reinfested. DDT therefore appears to be somewhat less effective than smear 62, the recommended tratment for protecting wounds of animals.

American Dog Tick

Because the American dog tick (**Dermacentor variabilis** (Say)) transmits the eastern strain of spotted fever, it has been desirable to develop a treatment that can be used on vegetation to free the premises of residences,

parks, and camp sites of these ticks. Emulsions containing 0.5 percent of DDT and 2.5 percent of soluble pine oil gave a high kill of these ticks. The applications were made at the rate of about 3 pounds of DDT per acre. Experiments with dusts containing DDT have not always been successful. Dips and dusts for the infested animals have not been so satisfactory as the standard dips and the ground derris or cube powders containing 5 percent of rotenone.

Brown Dog Tick

A dwelling at St. Andrews, Fla., heavily infested with all stages of the brown dog tick (**Rhipicephalus sanguineus** (Latr.)) was treated with DDT by E. B. Blakeslee. About ½ pound of powder containing 10 percent of DDT was applied beneath and behind the baseboards of all rooms. The dog in the house was treated with 15 grams (about ½ teaspoonful) of the powder on four occasions. There were no apparent ill effects upon the animal or the residents, and within 2 to 3 months the infestation was brought under complete control. For controlling light or moderate infestations, as little as 4 ounces of the 10-percent powder was found to be sufficient to give control of the infestation when applied in a small apartment where one dog was kept. One thorough treatment of a dog hospital brought freedom from brown dog ticks for almost a year. Sprays containing 5 percent of DDT were just as effective as powders for treating baseboard crevices.

Fowl Ticks

Poultry houses infested with the fowl tick (**Argas miniatus** Koch) were successfully treated by H. E. Parish with a residual spray containing 5 percent of DDT in kerosene. The treatment was applied to the perch poles and to cracks, crevices, and other hiding places of the ticks. For 3 months following treatment no living ticks could be found. On account of the long life of this tick, the test will be observed for any reoccurrences of the infestation.

Gulf Coast Tick

The bite of the Gulf Coast tick (**Amblyomma maculatum** Koch) is an important cause of screwworm attack on livestock in the coastal areas of the Southern States. From about the first of August until the latter part of October approximately 85 percent of all screwworm infestations occur in injuries produced by this tick, and there is need for a treatment that will remain effective for 10 weeks or more. In Florida tests were made by W. G. Bruce and A. L. Smith to determine the effectiveness of a treatment containing 5 percent of DDT in a nondrying adhesive, which is a form of synthetic rubber, and dibutyl phthalate, This treatment had been used against this tick by E. B. Blakeslee in Florida. Dish-mop and paint-brush methods of application were fairly satisfactory, but the use of the bare hand was faster and afforded a more complete coverage of the ears of long-haired cattle. On 18 head of cattle that were wild and difficult to handle, it was almost impossible to obtain complete coverage of the ears, and 20 days after treatment only about 20 percent of the ticks on these animals were killed. In 7 tests made on as many ranches, representing a total of 250 head of cattle, no screwworms developed in the ears of any of the treated animals, whereas many ticks were present on untreated cattle ranging in the same pastures.

In Edna and Port Lavaca, Tex., the treatment was applied by H. E. Parish and C. S. Rude in several experiments. On one ranch 592 head of mixed cattle having an average infestation of 4.49 ticks per ear were treated. At the end of 2 weeks the number was reduced to 0.5 tick per ear and only 10 percent of the animals required another treatment. Four weeks later there were 1.85 ticks per ear and one-third of the animals needed another treatment. The untreated animals on the ranch had 5.95 ticks per ear 2 weeks after the treating date, and 14 ticks per ear at the end of 4 weeks.

On another ranch 778 head of mixed cattle averaged 4.6 ticks per ear when treated, and 2 weeks later averaged 0.2 tick per ear. During the same period a treatment of 35 horses reduced the number of ticks per ear from 3.4 to 0.5.

Lone Star Tick

The clothing of several volunteer workmen in woods in southern Georgia was treated by C. N. Smith with a 10-percent DDT powder or a 5-percent DDT emulsion and worn by them on a range infested with the lone star tick (**Amblyomma americanum** (L)). The treatments did not prevent attachments and engorgements of the ticks. In preliminary tests a 5-percent DDT powder applied to grass land at the rate of 3 pounds per acre killed all stages of this tick, and 1 pound of DDT per acre applied in a pine-oil emulsion was equally effective. Dips with 1 percent of DDT in a pine-oil emulsion showed some promise when used for dipping infested dogs, but did not kill the larvae that were attached.

Relapsing Fever Tick

Specimens of the tick that carries relapsing fever, **Ornithodoros turicata** (Duge's), were treated in the laboratory with spray emulsions of DDT furnished by the Bureau to Neal M. Randolph, of the Texas State Board of Health. Sprays containing 10 percent of DDT killed 90 percent of the ticks, when applied as a direct spray, the mortality occurring gradually after 6 days and being complete 9 days after treatment. A 1-percent DDT spray applied to the inside of cages containing no debris or litter gradually killed 90 percent of the ticks at the end of 30 days. Sprays applied to clay floors in the cages killed about 20 percent of the ticks. These findings suggest that DDT sprays may kill many of the ticks in caves. Inside of dry caves, however, under natural conditions, such a treatment could not be expected to eradicate an infestation.

Winter Horse Tick

A wash used by H. E. Parish and C. S. Rude on 35 horses infested with the winter horse tick (**Dermacentor nigrolineatus** (Pack.)) contained 0.9 percent of DDT in a soluble-pine-oil emulsion. It killed all the ticks on the horses and protected them from reinfestation for about 60 days. There was no apparent injury to any of the horses; on the contrary there appeared to be an improvement in the skin and hair. Similar washes with less DDT did not kill all the ticks present.

External Parasites of Rats

At Savannah, Ga., H. K. Gouck treated four poultry-produce stores for control of fleas, mites, and lice on rats. As soon as some rats were caught from these premises, they were killed and placed in bags and fumigated. The parasites were then collected and retained for identification. Specimens were identified as **Nosopsyllus fasciatus** (Bosc.), **Lipoyssus bacoti** (Hirst), **Xenopsylla cheopis** (Rothsch.), **Ctenopsyllus segnis** (Schon.), **Echidnophaga gallinacea** (Westw.), **Laelaps hawaiiensis** (Ewg.), and **Polyplax spinulosa** (Burm.),

Store A was treated by means of a dust gun, using 3¾ pounds of 10-percent DDT powder; store B was treated with 5¼ pounds of DDT; and store C was treated by using 24 paper cylinders each containing 25 grams of DDT. Four days after treatment there was a decrease

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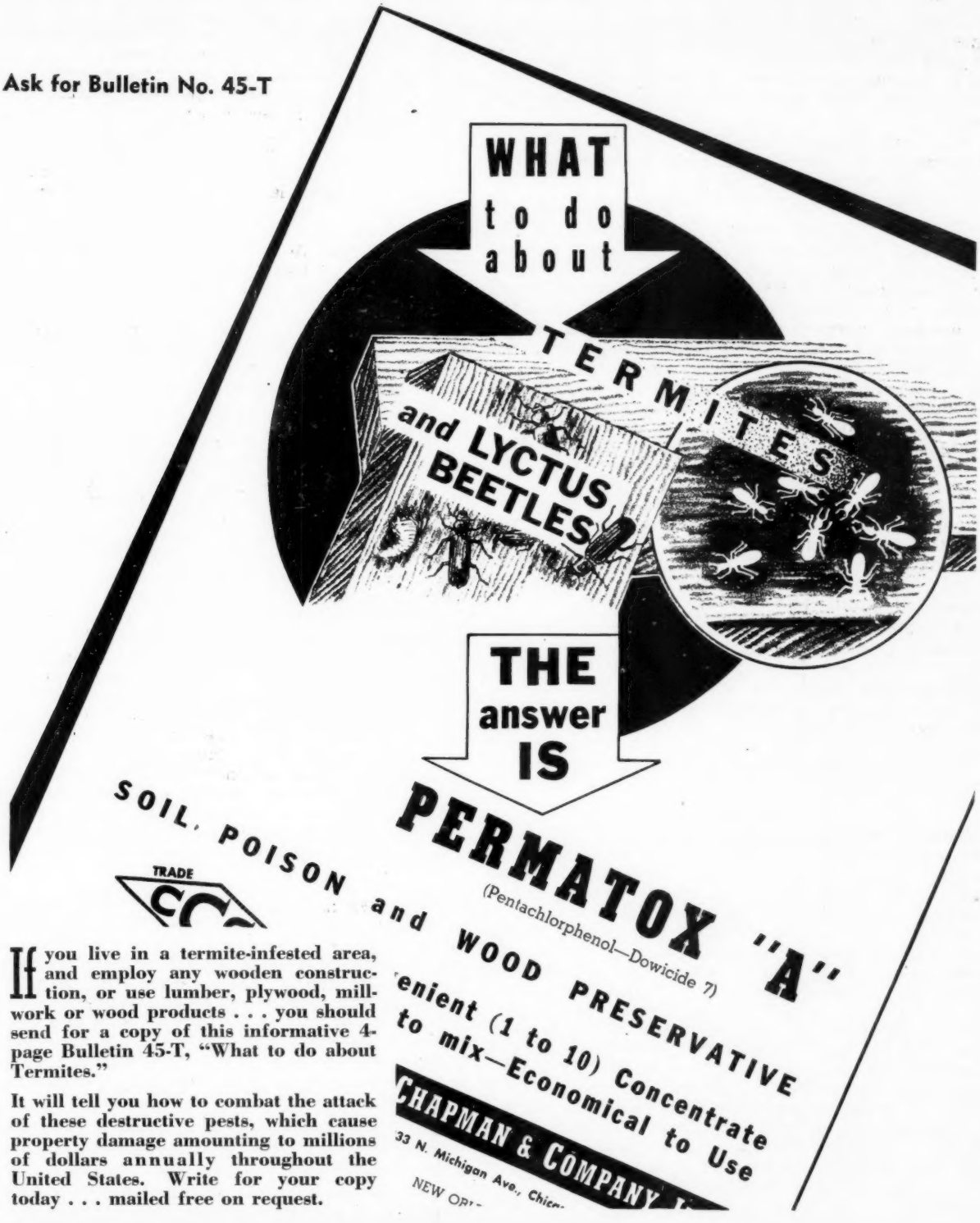

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of 90 percent in fleas, 100 percent in mites, and 73 percent in lice in store A; and a decrease of 100 percent in fleas and 92 percent in lice in store B, all as compared with the number of insects on rats before treatment. In store D (untreated) there was an increase of 2 percent in fleas, 65 percent in mites, and a decrease of 78 percent in lice.

This study suggests that DDT dusts are promising as treatments for control of external parasites of rats. Further observations are being made to determine the period of effectiveness of the treatmnts.

Ants

Ant hills built by one species of **Tapinoma** between the bricks of a drive-way and between stones of a terrace were promptly abandoned when DDT powder was placed on them. The treatments were made in June and the nests remained unoccupied for the remainder of the season. During July and Sptember numerous ant colonies were treated with 10 percent of DDT in pyrophyllite. A small amount of the powder placed around the entrance holes of the nests of fire ants **(Solenopsis geminata** (F.)) resulted in a complete disappearance of the ants. When undiluted technical DDT was placed in very small amounts about the surface of two large nests of carpenter ants **(Camponotus** sp.), in soil against a house foundation, all the ants disappeared. A small amount of a 10-percent DDT-pyrophyllite powder was dusted over trails of the crazy ant **(Paratrechina longicornis** (Latr.)), and a spray containing 5 percent of DDT was applied to floor areas infested with this species; in both cases the ants disappeared for more than 3 months.

In residences sprays containing 5 percent of DDT in kerosene killed all ants hit with the spray, but some of these treatments gave only temporary relief. The treatments were ineffective against ants that did not make trails into the buildings because it was impossible to anticipate their route of travel and thus treat the proper places. They were more effective when applied to ant trails but did not prevent all the ants from foraging in kitchens.

Bedbugs

Kerosene sprays containing 5 percent of DDT have been used extensively on beds of Army and Navy personnel for control of bedbugs. Recently a large number of tests were undertaken, in cooperation with the National Pest Control Association, in about 20 cities of the United States to determine the efficacy of the treatments for use in apartments, hotels, and residences. Deodorized-kerosene sprays containing 10 percent of DDT in pyrophyllite were furnished to pest control operators, together with suggestions on methods of application. Mattresses, pillows, bedsprings, and crevices about the beds were treated with the spray or the dust. From these tests it was learned that double beds could be treated effectively with 3 liquid ounces of spray or with 2 ounces of the powder. The treatments persisted long enough to kill the bugs that came out of hiding to obtain a meal of blood. In theatres and in railroad cars, on seats that were infested with bedbugs, sprays were apparently used with results equal to those obtained on bedding.

Cockroaches

Experiments were conducted against the American cockroach **(Periplaneta americana** (L.)), the German cockroach **(Blattella germanica** (L.), and the brown-banded roach **Supella supellectilium,** (Serv.) in cooperation with government agencies and pest control operators interested in the control of cockroaches in civilian food establishments and kitchens. The experiments were carried out under various conditions with 5 percent of DDT in kerosene or emulsions, or with 10 percent of DDT in pyrophyllite. It appeared that any one of the treatments was as effective as sodium fluoride when applied by trained persons to the proper places. Within an hour or 2 after treatment some dead roaches were found and many living ones showed the effects of the treatment, and after about 7 days the populations of the roaches were greatly reduced. In the South, where roaches often develop outside of buildings and migrate into kitchens, and also to prevent importation of new roaches in grocery or other deliveries, it was important to maintain a residual treatment in favorable places to kill the roaches and to keep new ones from becoming established. Because cockroaches like to walk upside down beneath refrigerators, table tops, and shelves, a spray was used in conjunction with any dust treatments made in kitchens. Sprays were used to good advantage in cupboard drawers and other partly closed spaces against the German roach, or in radios and similar places for the brown-banded roach. Kerosene sprays should be used only in places where they offer no fire hazard.

Fleas

In experiments made by A. W. Lindquist in Florida and C. N. Smith in Georgia, powders containing 10 percent of DDT in pyrophyllite applied at the rate of about 10 grams (1/3 teaspoonful) for an average-size dog killed the flea **Ctenocephalides canis** (Curt.) within 10 to 15 minutes to a few hours. The treatments temporarily stimulated the fleas to become active on the animal, and some dogs continued to scratch for about an hour. A single treatment protected the animals from further infestations for 4 to 7 days. These treatments were supplemented by dusting or spraying of infested bedding and premises at the rate of 1 pound of a 5-percent DDT powder or ½ gallon of a spray containing 5 percent of DDT per 1,000 square feet. The dusts containing 1 percent of DDT and the pine-oil emulsions containing 0.2 percent of DDT were used satisfactorily on lawns infested with fleas, but oil sprays often burned the grass. Single treatments of dogs and kennels yielded satisfactory control of fleas, including the sticktight flea, **(Echidnophaga gallinacea** (West.)). Cats often became sick from licking the powder from the hair, and some of them ingested enough DDT to cause their death.

Wasps and Hornets

Colonies of wasps were destroyed by Helen Sollers in many places in Washington, D. C., and vicinity, with applications of a 10-percent DDT-pyrophyllite dust into the entrance holes of the nests. Treatment of a nest of **Vespula maculifrons** (Buyss.) established beneath a rear porch between a floor and ceiling destroyed the colony. Where yellow jackets **(Vespa** sp.) occupied a gourd that had been used as a wren's nest, a dust treatment freed the gourd of the pests within 24 hours. A similar treatment of two nests of **Vespula diabolica** (Sauss.) was ineffective.

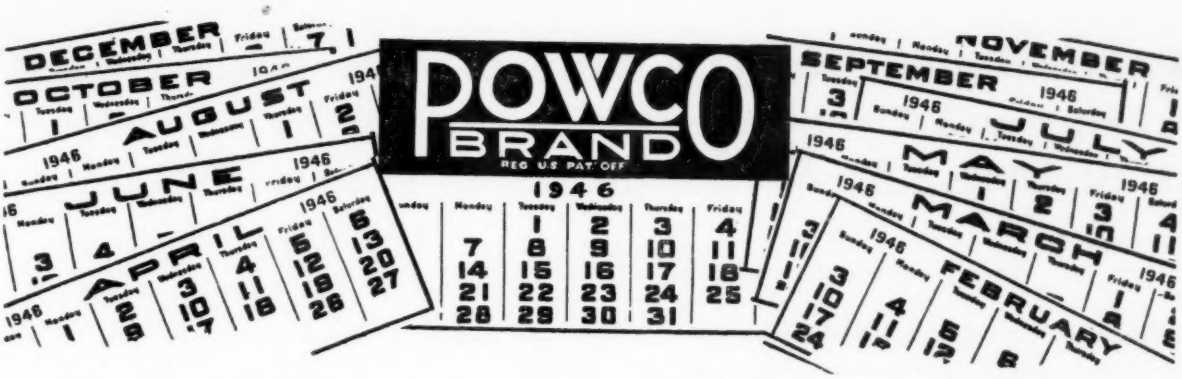
A white-faced hornet's nest over the entrance to a garage, treated by the same method, was found to be abandoned the following morning.

Wasps **(Polistes** sp.) nesting beneath a doorstep in a cellar area- and near an electric-light fixture on a porch, were dusted with this powder with excellent results. No **Polistes** were seen after 12 hours.

It appears that a 10-percent DDT-pyrophyllite mixture will prove useful for control of wasps' and hornets' nests.

[1]Includes other arthropodes, such as mites and ticks.

Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, U. S. D. A., E-673, October, 1945.



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Poetical and Practical Aspects of the Two-winged Flies and Fly-borne Disease. Part II - Families Culicidae, Chironomidae, Tabanidae and Others*

By C. R. TWINN, *M.Sc., Ph.D.,*
Ottawa, Ont.

Family Culicidae: Gnats and Mosquitoes.

"Over the pools in the burn water-gnats murmur and mourn."
Leonine Elegaics: Tennyson.

IN the world at large, mosquitoes are one of the most economically important of insect families, because the females are bloodsuckers and serve as the intermediate hosts of several very serious diseases of humans, including malaria, yellow fever, filariasis, and dengue or break-bone fever.

Between 1500 and 2000 species have been described in this world-wide family, the bulk of which occur in tropical regions. However, although the species are comparatively few in the colder parts of the globe, the number of individuals is enormous. There are less than 30 species in the British Isles, about 60 in Canada, and only two in the Arctic, but nevertheless they are very abundant and notorious bloodsuckers, especially in the latter two regions.

Mosquitoes are rather fragile, slender insects, with a long piercing proboscis, and narrow wings, the veins and posterior margins of which are fringed with scales. In England they are commonly called gnats and there are a number of allusions to them under this name in poetry and drama.

There appears to be only one clearly recognizable reference to them in the Bible. This occurs in the well-known passage in **Matthew** (XXIII) wherein Jesus says:

"Woe unto you scribes and Pharisees, hypocrites! for ye pay tithe of mint and anise and cummin, and have omitted the weightier matters of the law, judgment, mercy and faith: these ought ye to have done, and not to leave the other undone. Ye blind guides, which strain at a gnat and swallow a camel."

The gnat was probably mentioned only because of its small size. Chaucer used it in the **Maunciple's Tale** to show how small was the worth of the man that cuckolded his friend:

"'Phebus,' quod he, 'for al thy worthyness,
For al thy beute and thy gentiles,
For alle thy songes and thy menstralcie,
For al thy waytyng, blered is thin ye,
With oon of litel reputacioun,

Nought worth to thee as in comparisoun
The mountaunce of a gnat, so mot I thryve;
For on thy bed thy wif I sough him swyve.'"

Shakespeare, too, used the gnat to illustrate something very small: in **Cymbeline** (I.3), when Imogen says that if she could have seen her lord sail away on his ship she would have followed him with her eyes:

". . . till he had melted from
The smallness of a gnat, to air.",

and in **The Rape of Lucrece** (I.1014), wherein appears the statement that:

"Gnats are unnoted whereso'er they fly,
But eagles gaz'd upon with every eye."

In **The Comedy of Errors** (II.2), Shakespeare either referred to some other kind of insect, or was ignorant of the mosquito's biology. This allusion occurs when Antipolus of Syracuse, after beating his servant Dromio for jesting at his expense, warns him to be sure of his master's mood another time, for:

"When the sun shines, let foolish gnats make sport;
But creep in crannies, when he hides his beams."

Actually, although some species of mosquitoes may be active in the daytime, the majority prefer to do their flying, biting and mating at dusk or after dark.

Nowadays it is common knowledge that mosquitoes develop only in stagnant water, or in water that is no more than sluggishly flowing in a stream choked with plant life. Considerable variation exists in the types of breeding places, the duration of the life-stages, and the habits of the different species. In general, the female may lay several hundreds of eggs on water or in low places where water collects, and the larvae or "wrigglers" that hatch therefrom feed on minute life and organic matter, and obtain air by applying a tubular organ at the end of their tail to the water surface. The larvae eventually transform into comma-shaped, active pupae, which breathe through a pair of tubes on the back. When the mosquito is ready to emerge, air is taken into the pupal case causing it to float. It splits along the back, the mosquito crawls out and presently is able to fly away.

These and many other elementary facts about mosquitoes were not known in Edmund Spenser's time, but this poet made several keen observations about them. In **The Faerie Queene** (I.1.23), the knight, while fighting a monster that had emerged from a cave in thick woods to confront him and his lady fair, is beset by the monster's "fruitful cursed spawne of serpents small" which he disposes of:

"As gentle shepheard in sweete eventide,
When ruddy Phebus gins to welke in west,
High on a hill, his flocke to vewen wide,
Markes which doe byte their hasty supper best;
A cloud of cumbrous gnattes doe him molest,
All strivnig to infixe their feeble stinges,
That from their noyance he no where can rest;
But with his clownish hands their tender wings
He brusheth oft, and oft doth mar their murmurings."

This description is so good that one may feel confidence in identifying the mosquitoes as belonging to the genus **Theobaldia.** The words "cumbrous gnattes" call to mind large, clumsily flying mosquitoes; and "striving to infixe their feeble stinges" clearly indicates them to be rather timid biters. Edwards and James (2) state that **Theobaldia annulata** Schr., is the largest of British species, and one of the largest biting mosquitoes in the world. The females attack man and domestic animals at dusk. A closely related species **T. alaskaensis** Ludl., occurs in hilly districts in the north of England and Scotland and is recorded as rather timid in attack.

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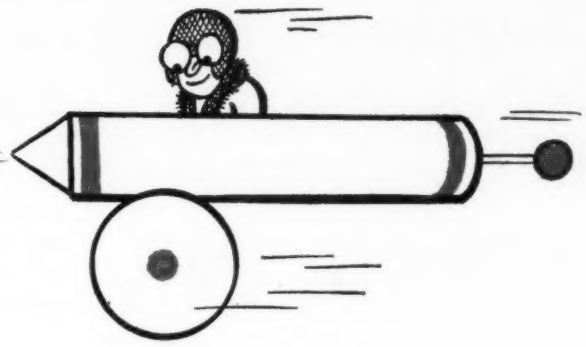

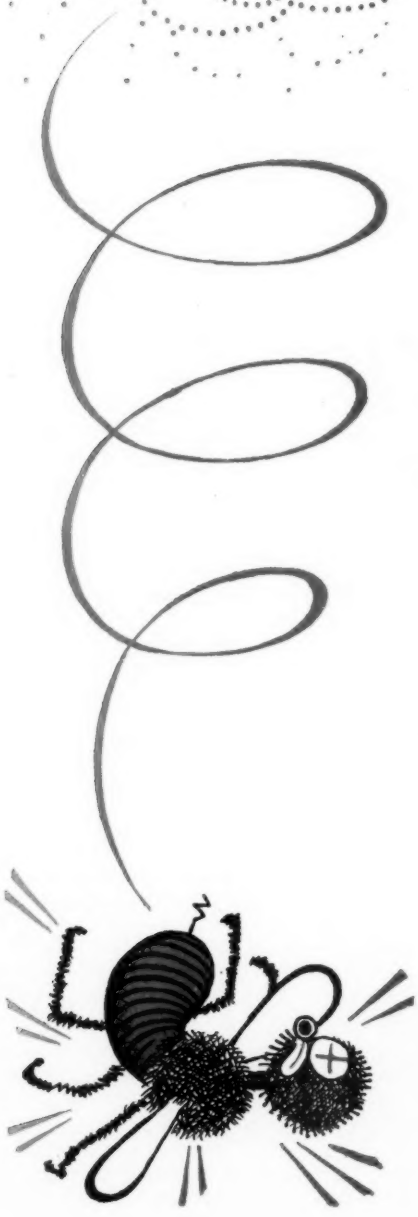

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Fens are low marshy areas in which ideal mosquito breeding places are likely to exist. One might visit such a place in the daytime and not be molested by mosquitoes, but when the sun goes down the shrill piping of myriads of tiny wings is heard, and woe betide the man or beast who lingers there, whether from choice or necessity. Spenser uses this sudden onslaught of mosquitoes on unwary travellers as an illustration in **The Faerie Queene** (II.9.16), of the fierceness of a surprise attack. In this instance the knights were suddenly assailed by an armed rabble:

"As when a swarme of gnats at eventide
Out of the fennes of Allan doe arise,
Their murmuring small trumpetts sownden wide,
Whiles in the aire their clustring army flies,
That as a cloud doth seeme to dim the skies;
Ne man nor beast may rest or take repast
For their sharpe wounds and noyous injuries,
Till the fierce northerne wind with blustring blast
Doth blow them quite away, and in the ocean cast."

Spenser also wrote a piece called **Virgil's Gnat.** A shepherd was sleeping on the ground near his flock and was in deadly peril from a serpent approaching him. The gnat woke the shepherd to his danger by biting him on the eyelid, and was inadvertently killed for his pains. Spenser referred to the gnat as a male. As is now well known only the females attack man and animals. The desire of the female for a meal of blood appears to be a biological urge connected with the proper development of the ovaries and egg laying. The mouthparts of the males are too feeble to bite animals, and they feed upon nectar and other plant juices. The latter may also serve as part of the female diet.

Wordsworth had first-hand knowledge of the avidity of blood-hungry female mosquitoes. When mountaineering in the Alps, he and his companion, Robert Jones, were lost on the night of August 21, 1790, in the forest near Lake Como, and were attacked by large numbers of msoquitoes, probably **Aedes** species. He graphically recorded this experience in **The Prelude** (VI.712), as follows:

". . . On the rock
At last we stretched our weary limbs for sleep,
But could not sleep, tormented by the stings
Of insects, which, with noise like that of noon,
Filled all the woods:".

It is a common habit among mosquitoes for the males to fly together in swarms about sunset in a sort of mating dance. This has been specially observed of the domestic species **Culex pipiens** L., which is numerous in England. The insects fly up and down and weave in and out in hovering clouds over hedges, trees and buildings, until night falls. While this is going on the females fly into the swarm and emerge each with a mate. It was probably a mating swarm that Keats described in these beautiful lines from the poem **To Autumn.** The "sallows" referred to are low-growing or shrubby willows.

"While barred clouds bloom the soft-dying day,
And touch the stubble-plains with rosy hue;
Then in a wilfull choir the small gnats mourn
Among the river sallows, borne aloft
Or sinking as the light wind lives or dies;
And full-grown lambs loud bleat from hilly bourn;
Hedge-crickets sing;
The red-breast whistles from a garden croft,
And gathering swallows twitter in the skies."

Kirby and Spence (4, p. 59) record that in the year 1736 mosquitoes arose in vast volumns like smoke from Salisbury Cathedral, which many people thought was on fire. Again, in August, 1766, incredible numbers appeared at Oxford and were like a cloud darkening the sky. Other authenticated cases of this interesting phenomenon have been recorded. A more usual swarm served Shelley as an appropriate simile in **Fragments of an Unfinished Drama:**

"Methought I saw
A glassy vapour dancing on the pool,
And on it little quaint and filmy shapes,
With dizzy motion, wheel and rise and fall,
Like clouds of gnats with perfect lineaments."

Even mosquitoes that are not disease-carriers can irritate and annoy sensitive people sufficiently to impair their health. There is something alarming and persistently sleep-destroying in the high pitched menacing hum of a mosquito in one's bedroom. Perhaps Tennyson had this in mind when writing the lines in **Lancelot and Elaine** wherein Guinevere urges Lancelot to leave her for the jousts to avoid suspicion of their love, saying:

"The tiny trumpeting gnat can break our dream
When sweetest; and the vermin voices here
May buzz so loud—we scorn them, but they sting."

It is probably not generally realized that Robert Browning's **Pied Piper of Hamelin** was a mosquito control expert as well as a rat destroyer, but the evidence of this is to be found in the poem. When the Pied Piper entered the Town Hall of Hamelin where the Mayor and Corporation sat considering their rat problem he:

". . . advanced to the council table:
And, 'Please your honours,' said he, 'I'm able,
By means of a secret charm, to draw
All creatures living beneath the sun,
That creep or swim or fly or run,
And after me so as you never saw:
And I chiefly use my charm
On creatures that do people harm,'".

After which he added, and this is the evidence:

"'In tartary I freed the Cham
Last June, from his huge swarm of gnats';".

So, there you have it! How unfortunate for suffering humanity that owing to the cupidity of the Mayor and Corporation of that small German city this remarkable man was lost forever in the heart of a mountain!

Malaria or the Ague

Of the several serious diseases transmitted by mosquitoes only one has ever been well established in the British Isles, but that one is malaria, a paramount scourge of humanity in tropical countries. Nowadays, thanks to modern knowledge and hygiene, drainage of marsh lands, changed living habits, and certain other factors, it is practically non-existent in the United Kingdom, although sporadic cases may appear due to the return of persons, such as soldiers, from warmer countries, with the malaria plasmodium in their blood, which may, through their exposure to bites of **Anopheles** mosquitoes be transmitted to healthy persons.

The disease used to be known in England as ague, and later was called malaria which means literally, "bad air," indicating the popular belief it was caused by the marsh air. It was not until 1897 that Sir Ronald Ross announced his great discovery that malaria is carried solely by the "dapple-winged" mosquitoes of the genus **Anopheles,** and thus paved the way for the control of this and other insect-borne diseases.

In old "Merrie" England ague was quite common, for even just outside the walls of London the badly drained fields produced great numbers of mosquitoes, some of which would most likely be carriers. Shakespeare in his plays refers to ague at least sixteen times. In **I Henry IV** (III.1) he makes it obvious that he associated the disease with swampy places. This was when Hotspur said regarding Bolingbroke's reverses at the hands of Glendower:

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"Home without boots, and in foul weather too!
How 'scapes he agues, in the devil's name?"

He also knew of its debilitating affects, as shown in **Julius Caesar** (II.2), where Caesar says to Caius Ligarius:

"Caesar was never so much your enemy as that
same ague which hath made you lean."

A third example is to be found in **The Tempest** (II.2), when Stephano, the drunken butler, sees a four legged monster (formed by Trinculo and Caliban hiding under the latter's cloak), and exclaims:

"This is some monster of the isle with four legs, who hath got, as I take it, an ague." He gives Caliban a drink from his bottle with the remark, "this will shake your shaking. . . . If all the wine in my bottle will recover him, I will help his ague.", and later he asks Caliban: "How now, moon-calf? how does thine ague?".

Robert Burns also alludes to malaria in **Address to a Toothache,** in the lines:

"When fevers burn, or ague freezes,
Rheumatics gnaw, or cholic squeezes;
Our neighbours' sympathy may ease us,
Wi' pitying moan;".

There were even stranger remedies for malaria than Burns' "pitying moan." Some of these involved the use of spiders. In Elizabeth's time it was believed, at least by some, that a sure cure was to swallow a house-spider alive in treacle. Pepys found that placing a spider in a walnut shell, wrapping it in silk and carrying it thus in one's pocket was beneficial. Eleazar Albin, in a natural history of spiders published in London in 1736, also declared that one of the house spiders has excellent virtues "in the cure of intermitting fevers, when the bark and other remedies have failed. . . ." The recipe follows:

"As much of the clean web of the house spider as the weight of two scruples; Mithridate two drams; mix and give it to the patients the night before the fit; let them take after it four ounces of treacle-water, and go to bed and cover themselves warm, endeavouring to sweat. They will have a most severe fit after taking the first dose, but after the second dose it will leave them. By this method I have cured many people of stubborn and long continu'd tertian, quartan, and quotidian Fevers. . . . I have likewise cured several children, both male and female, by hanging a large spider confined alive in a box about their neck, reaching to the pit of the stomach, without giving any internal remedies."

Fantastic, but hardly effective against an organism which destroys hundreds of thousands of human lives annually!

In times past ague was prevalent among the people who lived in or near the fenlands. Perhaps James Thomson had the fens in mind when he wrote the flolowing in **The Seasons: Summer:**

"When o'er this world, by equinoctial rains
Flooded immense, looks out the joyless sun,
And draws the copious stream: from swampy fens,
Where putrefaction into life ferments,
And breathes destructive myriads; or from woods,

"Impenetrable shades, recesses foul,
In vapours rank and blue corruption wrapt,
Whose gloomy horrors yet no desperate foot
Has ever dared to pierce; then, wasteful, forth
Walks the dire Power of pestilent disease."

In the seventeenth century the English fens consisted of nearly three-quarters of a million acres of morass studded at wide intervals with islands of firm land where, according to Finnemore (3), "lived the Fenmen, an ague-stricken race, gaining their living by fishing and fowling." Since then this district has been thoroughly dyked and drained and now constitutes a fertile and valuable area of agricultural land free from the scourge of mosquito-borne disease.

Family Chironomidae: The Midges.

The midges have a close superficial resemblance to mosquitoes, but may be readily distinguished from them by the absence of scales on their wings. They are a numerous family but do not appear to have figured much in poetry and drama. The larvae develop in water-bodies of various kinds, and the adult midges may often be seen towards sunset dancing in the air in swarms during which pairing of the sexes takes place. Such an occasion was observed by Owen Meredith (Bulwer Lytton) and recorded in these lines:

"Meanwhile, there is dancing in yonder green bower
A swarm of young midges. They dance high and low;
'Tis a sweet little species that lives but one hour,
And the eldest was born half an hour ago."

It is rather difficult to separate the poetical allusions to midges from those concerning other insects of similar habits, but it seems likely that Wordsworth was also describing mating swarms of midges in the following lines from **The Excursion:**

"Creatures that in communities exist
Less, as might seem, for general guardianship
Or through dependence upon mutual aid,
Than by participation of delight,
And a strict love of fellowship combined.
What other spirit can it be that prompts
The gilded summer flies to mix and weave
Their sports together in the solar beam,
Or in the gloom and twilight hum their joy?"

Another allusion is found in Coventry Patmore's **The Cry at Midnight,** wherein it is stated that:

"The midge's wing beats to and fro
A thousand times ere one can utter 'O'."

This is doubtless poetic license, but the wing beat is unquestionably rapid, and produces the tiny shrill piping characteristic of these insects in flight.

Family Tabanidae: The Horse Flies.

The flies in this family are the rather large, somewhat flattened, robust insects, which are often seen on warm, sunny days attacking horses, cattle, other animals, and not infrequently, man. Their eyes are large and iridescent in life, revealing brilliant shades of colouring. The mouthparts are in the form of a piercing proboscis: the females are avid blood-suckers, but the males live on nectar and other plant juices.

Horse flies are swift and powerful fliers and animals sometimes run away in fear of them. Catlow (1, p. 305) suggests that a horse fly was meant in **Isaiah** (VII) in the words:

"The Lord shall hiss for the fly that is in the
uttermost part of the rivers of Egypt.",

and states that Virgil described this insect under the name of **Asilus***, as follows:

"Of winged insects mighty swarm are seen;
This flying plague (to mark its quality)
Oestros the Grecians call—Asilus we:
A fierce, loud buzzing breeze. Their stings draw blood,
And drive the cattle gadding through the wood."

*It might, of course, have been **Hypoderma,** the warble or heel fly.

Others, however, have thought that the fly mentioned in Isaiah is the tsetse fly, which belongs to a different family and is the carrier of the dreaded African sleeping sickness of humans and nagana of horses.

Perhaps it was a tabanid that attacked Chaucer's noble and patient lion, in **The Legend of Good Women:**

"For lo, the gentil kind of the lioun!
For whan a flye offendeth him or byteth,
He with his tayl awey the flye smyteth,

Santobane* will undoubtedly become a potent factor in controlling many disease-carrying pests harmful to humans—as well as in controlling many insects that destroy plant life.

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Al esily; for, of his gentrye,
Him deyneth nat to wreke him on a flye,
As doth a curre or elles another beste."

Tabanid flies are especially troublesome in the vicinity of ponds, streams and marshy places, along the margins of which their larvae develop in damp soil or mud and are predacious on small animal life such as earthworms and the larvae of insects. The females lay their eggs in a compact mass on the leaves of aquatic and other plants overhanging the water, and the larvae on hatching fall in and find their way to the favoured habitat. When full-grown they move to drier ground before pupating.

Keats had trouble with biting flies which were evidently tabanids, while on a visit to a place near Glasgow. He wrote a rather humourous rhyme on this incident in a letter to his brother Thomas, dated July 17, 1818, of which the following is an extract:

"I have just been bathing in Loch Fyne, a salt water lake opposite the Windows,—quite pat and fresh but for the cursed Gad flies—damn 'em, they have been at me ever since I left the swan and two necks."

This statement was followed by a ballad of 14 stanzas on the gadfly of which the following are representative:

"The Gadfly he hath stung me sore—
O may he ne'er sting you!
But we have many a horrid bore
He may sting black and blue.
* * *
"Has any here an old grey mare
With three legs all her store,
O put it to her buttocks bare
And straight she'll run on four.
* * *
"Is there a Man in Parliament
Dumb-founder'd in his speech,
O let his neighbour make a rent
And put one in his breech."

Family Oestridae: The Warble and Bot Flies.

The warble and bot flies are robust, somewhat hairy insects, rather like bees in appearance. They are important to agriculture because two species of the former spend their larval stages as internal parasites of cattle, and three species of bots develop in a similar manner in horses. The eggs are attached to the hairs of the animals. In the case of the bots, the hatching larvae are swallowed and fasten themselves to the stomach-wall, and when mature leave the animal through the anus. In the case of the warbles, they penetrate the skin and, after migrating for several months through the body, finally come to rest under the skin of the back, which they perforate for breathing and to provide an exit when their development is completed. This may be an over simplification of their complex life-histories, but it will serve to give an indication of the nature of these troublesome and injurious insects.

Shakespeare seems to be the only one among the English poets and dramatists to mention them. An old English name for the warble fly was "brize" or "breese" fly. In **Troilus and Cressida** (I.3) appears the remark by the Grecian leader Nestor, that:

"The herd hath more annoyance by the breese
That by the tiger."

This is an allusion to the great terror shown by cattle when warble flies, especially the larger form, **Hypoderma bosis** DeG., are flying at them to oviposit. Another reference to this phenomenon is to be found in **Antony and Cleopatra** (III.8), when Scarus describes to Enobarbus the flight of Cleopatra's ships at the battle of Actium:

"Yon ribaudred nag of Egypt,—
Whom leprosy o'ertake!—i' the midst o' the fight,
When vantage like a pair of twins appear'd
Both as the same, or rather ours the elder,
The breese upon her, like a cow in June,
Hoists sail, and flies."

Perhaps it was also a warble fly that Ben Jonson referred to in **The Poetaster** (III.1):

"Gods, you do know it, I can hold no longer,
This brize has pricked my patience."

The presence of large numbers of bots in the stomach of a horse may result in the animal suffering from general debility. In Shakespeare's time the origin of the bots was not properly understood, and perhaps poor food was considered a contributory cause to infestation. In any event, the carrier in **I Henry IV** (II.1), in the inn yard at Rochester, said to the other carrier when attending to their horses, that:

"Peas and beans are as dank here as a dog, and that is the next way to give poor jades the bots:".

Another reference to bots occurs in **The Taming of the Shrew** (III.2), when the servant Biondello says of Petruchio's horse it is "stark spoiled with the staggers, begnawn with the bots."

Family Drosophilidae: The Fruit Flies.

"'Tis eminence makes envy rise,
As fairest fruits attract the flies."
To Delaney: Swift.

These are the small reddish-brown flies often seen flying rather aimlessly about ripe or decaying fruit and fermenting materials, and suddenly alighting thereon to feed or lay their eggs. Milton wrote of them in **Paradise Regained** (IV.15):

"Or as a swarm of flies at vintage time,
About the wine press where sweet must is poured,
Beat off, returns with humming sound;".

Anyone who has made grape wine in the autumn will have had trouble controlling these pests, and in preventing them from drowning themselves in the wine. Among the good advice proferred by Tennyson's **Ancient Sage** is this admonition to avoid excessive eating and drinking:

"Nor roll thy viands on a luscious tongue,
Nor drown thyself with flies in honeyed wine:".

Tennyson may have had house flies in mind, but the fruit flies, too, ofter are found floating, dead, in wine.

Family Cordyluridae: The Dung Flies.

One genus of this family: namely, **Scatophaga,** consists of slender flies clothed with yellowish hair. These are called dung flies because of their habit of frequenting and breeding in fresh cow dung. Evidently George Herbert had observed them, for, in **The Church Porch,** he remarked on the similarity of their colour to cow manure, in order to point a moral:

"Make not thy sport abuses; for the fly
That feeds on dung is coloured thereby."

Another allusion is in Lyly's **Euphues** (p. 240) where reference is made to "the fly that shunneth the rose to light on a cow-shard."

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*Contribution No. 2390, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada.

FUMIGATION NEWS

FEBRUARY 1946

Published in the interest of Pest Control Operators and the use of
AERO BRAND HCN DISCOIDS AND CYANOGAS
by Insecticide Department of
American Cyanamid & Chemical Corporation
Kansas City 6, Mo. 30 Rockefeller Plaza, New York 20, N. Y. Azusa, Calif.

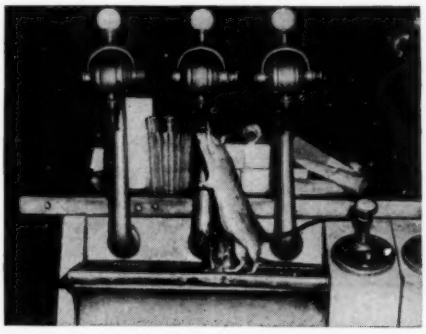
HCN DISCOIDS AND CYANOGAS SAFEGUARD PRECIOUS FOOD SUPPLIES FROM RAT DEPREDATION

Everyday, everywhere, rats are destroying food supplies intended for man. Consuming about 150 pounds a year per rat, rodents attack all types of stored food products before and after processing. They kill untold numbers of chickens, destroy their eggs and tons of chicken feed. They start countless fires by gnawing on matches, other combustible materials and the insulation on electrical wiring, causing damage that runs into millions of dollars.

Coupled with this destruction is the ever-present menace to health created by the disease-bearing germs rats carry. Bubonic plague, typhus fever, rat bite fever, spirochetal jaundice, rabies, trichinosis, are but a few to which research adds, as each year's work discloses other transmissible disease germs carried by rats.

The one certain way of killing rats as quickly as possible is by the use of hydrocyanic acid gas. For enclosed space fumigations AERO** BRAND HCN DISCOIDS are most effective and convenient for rodent control. When the HCN DISCOIDS are released from the sealed cans and exposed to the air, the gas is quickly set free and kills all rats within the area exposed to the gas. There is no damage to the building or furnishings, and clean-up after the fumigation is completed is simply a matter of disposing of the spent discs.

For outdoor fumigations, CYANOGAS* A-DUST is applied with the CYANOGAS Foot Pump directly to such varied rat harborages as open burrows in fields, along ditch banks, and levees; in city dumps and sanitary fills; under sidewalks, pavements, and tight floors; in lumber piles, rubbish, and other accumulations, and in corn cribs. It is easy to visualize that CYANOGAS is highly effective for this purpose, because each particle gives off its portion of hydrocyanic acid. The evolution of the gas is automatically produced by reaction with the moisture in the atmosphere when CYANOGAS is dusted into rodent burrows. Thus, by the injection of only a small amount of CYANOGAS a high concentration of hydrocyanic acid gas is built up in the burrow. *One whiff kills all rats in the burrow.* Also the rat fleas are killed at the same time, thus effecting a double purpose instantaneously in one operation. It is for this reason that CYANOGAS is the rodent control material preferred by pest control operators and health officers throughout the world.



(*Denny Hayes Photo*)
Known as the "soda fountain rat" the photo above is a graphic illustration of the need for rodent control.

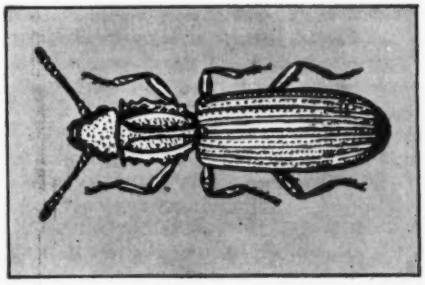
By gnawing on matches and other combustible materials rats start countless fires, causing damage that runs into millions of dollars each year.

STORED COMMODITY INSECTS

Saw-Toothed Beetle

The saw-toothed beetle is a common pest infesting stored foodstuffs. It feeds on flour, meal, grain, cereal products, and many other foods.

The beetle is dark brown in color and about one-tenth of an inch long. Its eggs hatch in about a week and the larvae are very active, crawling as they feed. This stage of the life-cycle lasts about three



weeks, when the insects pupate by forming cocoons of the foodstuff they are infesting. In this cell the pupal stage is spent, consuming about ten days. The entire life cycle, depending on moisture and temperature conditions, consumes from three to ten weeks.

A satisfactory kill of the general run of such insects infesting plants manufacturing, handling, and storing foodstuffs and other commodities, can be made with HCN fumigation, and regular periodic fumigation is the best method of keeping the ever-present insect problem under control.

FUMIGATOR'S FIRST AID KIT

A special Fumigator's First Aid Kit is now available for PCO's engaged in hydrocyanic acid fumigation. It contains cyanide antidote for use by the physician, as well as other first aid supplies and instructions. Kits can be ordered direct from the Insecticide Dept., American Cyanamid & Chemical Corporation, 30 Rockefeller Plaza, New York 20, N. Y.

For more information on fumigation with AERO BRAND HCN DISCOIDS and CYANOGAS Calcium Cyanide, write for free manuals.*

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How Hidden Business Expenses Affect Income Taxes

By **HAROLD J. ASHE**
Tax Counselor

IF YOU HAD $500 in the bank would you pay $115 or more income tax on that sum? The answer to that one is easy. You wouldn't! You'd pay only on such income as you derived from the $500.

But, believe it or not, an exceedingly large number of small businessmen of the country do just that every year in a left-handed manner. They pay an income tax on **apparent** profits which, actually, are depreciating assets. And, they also continue to pay income taxes on other unrecorded or hidden business expenses which, in the last minute scramble to meet the March 15 tax deadline, are overlooked.

While no one that I know has yet considered an income tax **per se** a virtue—though conceeding its necessity—the income tax may accomplish one good thing. It may make businessmen more alert to the true earnings of their respective businesses by giving them a monetary incentive for more careful checking on ALL expenses.

For generations, one of the minor tragedies of American business has been the illusion held by small businessmen that they make more money—what an employee calls take-home pay—than in fact they ever do. Simple books indicate a $4,000 income, with a drawing account of $3,000, apparently leaving an annual nest-egg of $1,000; yet ten years later, even though his nest-egg apparently continues every year, the operator wakes up one fine day to find it has all been a snare and delusion. It worked out beautifully on paper. Where has it gone? Was it merely a golden gleam in the eye of the businessman?

Usually, the answer is to be found in the constant drain upon the small business by hidden business expenses that do not appear in simple bookkeeping set-ups. Unless recognized and properly recorded as business expenses, these are the items that pilfer the cash drawer nightly as surely as a defaulting employee.

In recent years this has been more forcefully brought home to me by the preparation of income tax returns for countless small businessmen, most of whom are counted reasonably astute in business matters. In filling out 1944 income tax returns I estimated from my own experience that fully fifty percent of all small businessmen still fail to report ALL of the costs of doing business.

To illustrate how this works take a typical case. A business man has $3,000 worth of equipment calling for a depreciation rate of 10 percent annually, that is it has a life expectancy of ten years. He takes no depreciation in his tax return. Yet, if this taxpayer is even in the lowest surtax bracket of $2,000, this oversight costs him $69 additional tax, because his net profit—by his own calculations—is $300 greater by his failure to take $300 depreciation to which he is rightfully entitled.

Speaking from actual experience as a tax counselor I have found that the commonest over-sights are failure to take: 1. Depreciation on some or all of the taxpayer's equipment or fixtures; 2. depreciation on trucks; 3. depreciation on private cars used partly in business; 4. depreciation of machinery and heavy tools. I shall enumerate more in a moment.

The items already referred to represent business assets being liquidated through use in producing gross income, without which no gross income or net income would be possible. The cost, through depreciation, of these items is as much a cost of producing income as are labor, merchandise, supplies and the thousand and one petty items usually so carefully recorded.

Probably the simplest explanation as to why the above items seldom appear as business expenses is because they do not appear in the books as an expenditure in the year for which the report is made, having been acquired in previous years. Actually, if a delivery truck has been purchased say in 1942 for $800 and has a life expectancy of five years, then it follows that this truck (in initial outlay, alone) is costing the taxpayer $160 annually as surely as though an item for that amount showed as an outlay for the tax year reported.

Again, many businessmen operate their businesses in conjunction with their homes. A dual purpose property (home and business) serves to confuse them as to which is business and which is residence. Because they domiciled in such a property, they are inclined to think of such an establishment as a purely personal arrangement. Until advent of high income taxes there was no tax need for segregating business expenses from those of home. Moreover, many such taxpayers have long since arrived at the pleasant conclusion that, because the entire premises represent an outlay equivalent to that for a home alone, that they, in effect, are getting free rent for the business. Now such thinking becomes more than a harmless bookeeping deception. Such a belief results in higher income taxes. The Treasury Department has long recognized that part of such an establishment is a business expense and may be so considered in making an income tax return.

If the property is rented the business may be charged with a pro rata share of the rent, utilities and other divisible expenses. This may be as little as 25 percent, or as much as 75 percent, depending upon the division of improvements as between home and business.

Likewise, where the taxpayer owns the property and uses it in large part for business purposes, he frequently fails to charge the business with any of the expense. Here are just a few of the items that he is undertaking to bear, himself, instead of entering them as a business expense to determine his true net income: 1. annual maintenance cost; 2. depreciation of property; 3. utilities; 4. insurance. Interest on mortgage and real estate taxes are deductible as a personal item in any event.

Moreover, as a sole owner, the taxpayer is apt to bear the cost of business entertainment out of his personal pocket on the unsound theory that whether it is charged to the business or not does not materially affect him. Even taxpayers having modest incomes not infre-

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quently may spend several hundred dollars a year in small sums at a time treating their more favored customers and soliciting desirable prospective ones. This may involve lunches, liquid refreshments, cigars or any other outlay of a similar character. It is recognized by the Treasury Department as a deductible business expense item.

To illustrate the importance of a careful scrutiny of these expenses as they bear upon the real cost of doing business, let us take the case of a typical taxpayer.

Let us assume that he owns his own dual purpose property which, exclusive of land value, was worth $7,500 at time of acquisition. This is a two-story structure with salesroom and workshop downstairs and living quarters upstairs. In addition, garage buildings in the rear of the property are used for truck storage and other business purposes. A fair division shows that 2/3rds of the improvements are used for business and 1/3rd is personal.

He has a light truck acquired in 1942 for $500 and a larger truck acquired in the same year for $1,500; a passenger car purchased in 1941 cost him $900 and he uses this car 3/4ths for business and 1/4th for personal convenience and pleasure. Other equipment represents an initial outlay three years ago of $2,500. Office furniture and fixtures cost him $500, also three years ago.

During 1945 he paid a $60 insurance premium on the buildings. Repairs to the buildings (all necessary maintenance, as distinguished from capital improvements) cost him $450.

In addition he finds that he has spent $150 during the year to entertain preferred customers.

Now this taxpayer, brushing aside these cost-of-doing business items as of no importance, finds that by ignoring them he has a net income of $5,000 in 1945. He has deductions for charitable contributions, property taxes, medical expenses, etc., of $250. Besides his wife, he has three dependent children. Taking these personal exemptions and deductions into consideration, his net income subject to normal tax is $4,250 and income subject to surtax is $2,250. His normal and surtax is $582.50 and, for all the author knows to the contrary, such a hypothetical taxpayer might feel pretty good about it. After all, thinking that he has a $5,000 income, this taxpayer figures that the government has left him with over $4,400 after income taxes.

If, however, this taxpayer had taken full advantage of depreciation and other legitimate expenses he would have found that his seemingly handsome income of $5,000 was, in reality, only $3,375. Like a hibernating bear, the $1,625 differential between the illusory $5,000 and the real $3,375 income is his own fat that he has been living on and, more important, paying tax on to boot! If he goes ahead and pays on a $5,000 income when it is really only $3,375, this taxpayer will wind up after taxes with only about $2,800 instead of $4,400!

Here, if he really wants to get a true picture of his net income, are some of the additional business expenses that such a taxpayer must report in his income tax return. These are the items which, if not reported, boost his reported NET income and result in his paying a tax on depreciating assets and on other hidden current expenses.

20 percent depreciation on light truck	$ 100.00
20 percent depreciation on heavy truck	300.00
¾ths of 20 percent depreciation pass. car ($180)	135.00
⅔rds of 4 percent depre. on bldgs. ($300)	200.00
⅔rds insurance premium ($60)	40.00
⅔rds building maintenance ($450)	300.00
½ utilities on one meter ($200)	100.00
10 per cent depreciation on equipment	250.00
10 percent depreciation on office fixtures	50.00
Business Entertainment	150.00
Total	$1,625.00

Now let us look at this taxpayer's revised income tax return. His income subject to the normal tax has been reduced from $4,250 to $2,625, and income subject to surtax has been dropped from $2,250 to $625.

His income tax now figures $203.75 instead of $582.50, or a saving of $378.75, because his real net income has been demonstrably decreased by $1,625. Instead of having the illusion of a $5,000 income calling for $582.50 income tax he has now a real income—and he had only that income in any case—of $3,375 subject to $203.75, leaving him with a net after taxes of around $3,175, certainly an improvement over the real income of $2,800 after taxes had been paid on an illusory income of $5,000.

Certain warnings must be sounded. Figures in the above table of additional expenses are used only for explanatory purposes. Depreciation of certain equipment may be at the rate of 5 percent or 20 percent, depending upon its nature. Obviously equipment bought second-hand will have a shorter life than the same equipment purchased new. A passenger car may be used only 20 percent for business or as much as 100 percent. Use of one-half of the buildings would not necessarily justify 50 percent deduction of utilities, though on the other hand business use of utilities might be greater than home use. These are matters for the individual taxpayer to determine in the light of the facts applicable to his particular business set-up and experience.

In passing it should be noted that that part of the items traceable to personal or home use may not be deducted. It is because of this disallowance that a division is called for by the Treasury Department.

Also, failure to take any of these items in past income tax returns does NOT make it permissible to include past overlooked items in a current return, i.e.: two years depreciation on a truck, for instance, in a 1945 return because you failed to show it in a 1944 return, would be disallowed.

Nor may a depreciation schedule previously adopted be changed without Treasury permission merely to suit tax purposes of the taxpayer. Generally, a depreciation schedule, once elected, must be adhered to throughout the life of the asset being depreciated.

A check list of other deductible business expenses apt to be overlooked by the harrassed taxpayer include:

Membership fees in business associations, including chamber of commerce;

Expenses, including travel, hotel and meals, attending trade conventions;

Bad debts, so determined and written off in year deducted only;

Loss from theft, either cash or property, either business or personal, only to extent not covered by insurance;

Loss from accident, storm, hurricane, fire, flood, etc., either to business or personal property, to extent not covered fully by insurance;

Subscriptions to business and trade magazines;

Cost of coverall or similar type uniforms (but not regular clothes used for work) if not adapted to ordinary wear; also laundering same.

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ACCURATE INFORMATION based upon Du Pont's research and experience is now your reliable guide. The chart below highlights the five present formulations of DEENOL DDT. See your regular supplier. If he cannot supply you, write us for further information and our detailed DEENOL DDT folder. E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington 98, Delaware.

DEENOL 50-F	DEENOL 25-EM	DEENOL 5-H	DEENOL 25-C	DEENOL 10-A
Wettable powder; mix with water, use as spray. DDT—50%	Emulsifiable oil; dilute with water, use as spray. DDT—25%.	Ready-to-use oil spray. DDT—5%.	Concentrated oil; dilute with a solvent, use as spray. DDT—25%.	Ready-to-use dusting powder. DDT—10%.
For use on surfaces where *wetting* by water and *visible residue* are not objectionable.	For use on surfaces where *wetting* by water is not objectionable and *visible residue is* not desired.	For use on surfaces where *wetting* by water *is* objectionable and *visible residue is* not desired.	Designed for large users who may wish to prepare their own spray mixtures by adding solvents.	Use on floors and baseboards, in cracks and crevices of woodwork, dark places behind pipes and other places insects infest.
Effective against: Flies, ants, gnats, mosquitoes, fleas, ticks, wasps, cockroaches, carpet beetles, moths, silverfish, bedbugs, weevils, cadelle, and other stored product insects.				Designed especially for crawling insects such as cockroaches, ants, bedbugs, ticks, silverfish, lice.

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. . . THROUGH CHEMISTRY

Toxicity of DDT for Laboratory and Domestic Animals

By DR. P. J. G. PLUMMER*

THE RESULTS of toxicological studies conducted at the Animal Diseases Research Institute, Hull, may be summarized as follows:

1. **Animal Species**

   Toxicity of the drug varies for different animal species. Of the laboratory animals tested, the rat is the most susceptible; the guinea pig the most refractory. Among domestic animals, cattle are the most susceptible. Swine are comparatively resistant.

2. **Route and Vehicle**

   The drug is absorbed quicker and is more toxic when administered orally than when injected subcutaneously. It is approximately ten times more toxic when dissolved in an oily vehicle, than in an aqueous suspension.

3. **Feeding**

   The daily feeding of small doses of DDT may be recorded under three headings:

   (1) Parings from apples sprayed with four cover sprays of DDT.

   Rabbits, guinea pigs and rats were fed in amounts which would correspond to a daily intake of 20 to 25 apples by a man weighing 70 kilograms. The feeding continued for 161 days.

   (2) Outer leaves of cabbage dusted with DDT at the rate of 60 pounds per acre.

   The longest period of feeding was 49 days.

   (3) Flies knocked down by a 4% solution of DDT in coaloil were fed to four-week old chicks. The number of flies fed varied from 5 to 50 per day, and the experiment continued for 18 days.

   In the hundreds of experimental animals used in the above feeding experiments, symptoms of DDT poisoning were not observed in any instance.

4. **Spraying**

   (a) Cattle, horses, swine, sheep and rats were exposed to a single spray, covering the entire body, of a 5% solution of DDT in coaloil-Mentor-oil 29 mixture. Domestic animals remained normal; the majority of the rats exhibited toxic symptoms within 24 hours and 12% died within three days.

   (b) Exposure of the **conjunctiva** of cattle to DDT solutions in corn-oil. The installation of 10-40 mg. of the drug into the conjunctival sac did not cause conjunctivitis or toxic symptoms.

5. **Gross and Microscopical Pathology**

   Gross lesions definitely referable to the toxic actions of DDT were not found. Two hundred and ten animals, representing all the groups studies, were examined histologically. The principal and most consistent lesion was degeneration of the liver. This, however, was capable of complete repair, as animals killed a short time after the conclusion of the drug dosage revealed no abnormal change in the liver. Another lesion was a mild depletion of colloid material of the thyroid gland. This was not a consistent finding. In control groups, (animals fed the same ration without DDT) liver damage was found in some instances. Thus, some of the damage found in the experimental animals may not be due to the action of the drug. No visible changes were found in animals which died in the acute toxicity tests.

Animal Diseases Research Institute, Division of Animal Pathology, Science Service, Dominion Department of Agriculture.

—Calendar of Meetings—

Secretaries of Pest Control Associations, as well as others planning meetings of pest control interest, are invited to send date and place of such meetings for listing in this column. To insure maximum publicity in advance of the meeting, such information should be sent at the earliest possible time.

Sixth Annual Southern Pest Control Operators' Conference, Louisiana State University, Baton Rouge, La., February 14th, 15th, 16th.

Fourth Annual Canadian Pest Control Operators' Conference, University of Montreal, Canada, February 17 to 21, inclusive.

The Pest Control Operators of California (Conference Convention), Hollywood Roosevelt Hotel, Hollywood, California, February 25, 26, 27, 1946.

National Association of Home Builders of the United States, Annual Convention and Exposition, Stevens Hotel, Chicago, Ill., February 25-28, 1946.

International Chemical Exposition. Grand Central Palace, New York. February 25 through March 2. 20th exposition.

Michigan Pest Control Operators' Association Annual Short Course Meeting, Michigan State College, East Lansing, Mich., March 13 and 14, 1946.

Rutgers University (New Brunswick, N. J.) Annual Short Course, in cooperation with New Jersey Pest Control Association, will be held latter part of March, 1946, with no definite date set as yet.

National Association Insecticides & Disinfectant Manufacturers Mid-year Meeting, French Lick Springs, Indiana in June.

National Pest Control Association (14th Annual Convention), Roosevelt Hotel, New Orleans, La., October 28, 29, 30, 1946, (Tentative).

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A Report of Damage to Fabric by Liquid Hydrocyanic Acid Gas in Fumigation[1]

By G. C. SHERRARD, *Senior Surgeon (R),*
United States Public Health Service

RECENTLY, during fumigation of Coast Guard barracks at Baltimore, Md., a discoid of liquid hydrocyanic acid gas was thrown inadvertently on top of a Coast Guard hat band made of rayon material, which was lying on a mattress. When the liquid hydrocyanic acid gas in the discoid came in contact with the band, a gummy mass was formed. The individual rayon fibers appeared to have been softened and to have merged with each other, losing their identity. This effect probably was caused by the solvent action of the gas on the fibers. As seen in the accompanying photograph, the part of the fabric which did not come in direct contact with the discoid remained uninjured.

In order to determine whether or not an exceedingly high atmospheric concentration of hydrocyanic acid gas would cause damage to the uninjured portion, the band was exposed to an atmospheric concentration of 66.6 ounces of the gas per 1,000 cubic feet of space for a period of 4 hours. The test was performed in an airtight steel fumigating chamber, at a temperature of 50° F., and a +90-per cent relative humidity. The uninjured portion of the band then was inspected carefully for evidence of injury. No such injury could be demonstrated. In color, texture, strength, and pliability of the fabric, the exposed specimen could not be distinguished from a new band.

Tests performed by the author several years ago at the New York Quarantine Station showed that hydrocyanic acid gas discoids damaged linoleum through two layers of heavy brown paper, but that four layers gave protection.

Experienced fumigators are aware that floor coverings and highly finished floors are subject to what they term "burns," when placed in contact with absorbent discoids containing liquid hydrocyanic acid gas. For this reason, they protect such coverings and floors by several layers of paper or other protective materials placed at points suitable for the distribution of the discoids.

In ship fumigation, experience has shown that hydrocyanic acid in gaseous form will not injure fabrics when the atmospheric concentration is not greater than 6 ounces per 1,000 cubic feet of space. However, the direct contact of discoids containing this gas in liquid form is capable of causing damage. It is probable that this damage is caused by the solvent action of the liquid on the fiber or dye. Fabrics composed of fibers of animal or vegetable origin appear to be less susceptible to damage than those of synthetic origin. Fabrics with a nap or pile, such as blankets and carpets, are not so likely to be damaged by direct contact with hydrocyanic acid gas discoids, because the nap or pile permits enough circulation of air beneath the discoids to allow evaporation of the liquid hydrocyanic acid gas before it comes in contact with the body of the fabric. In higher concentrations, fragile fabrics, such as window curtains, have been observed to undergo a slight change of color, white fabrics assuming a slight orange tinge. Linen fabrics appear more susceptible to color change than fabrics composed of cotton or animal fibers.

The practice of distributing discoids directly on carpets, even though they are composed of animal fiber and have a deep pile, may result in spotting or discoloration of the area immediately beneath the discoid. Damage of this type has been observed in ship fumigation. Careful inspection indicated that the damage was caused either by a solvent action of the liquid acid on the fabric dye or by a chemical reaction between the dye and the acid, with no apparent damage to the fiber.

Since hydrocanic acid gas is slightly lighter than air and has a tendency to rise during the process of diffusion, it is good fumigating practice to distribute the discoids over the floor of the compartment to be fumigated. Therefore, it is a simple matter to protect finished floors or coverings by suitable layers of paper or canvas.

[1] From the Foreign Quarantine Division.
Public Health Reports, Vol. 60, No. 44.

Cushing to Again Head E. & P. Q. Division

The U. S. Department of Agriculture announced today that Col. Emory C. Cushing, who earned a citation for typhus control in European combat areas, will return to the Bureau of Entomology and Plant Quarantine when his military leave ends later in the month.

He will resume direction of the Division of Insects Affecting Man and Animals. During the past three years, the work of that Division has been under Dr. Walter E. Dove, who resigned on November 1 to enter private industry.

In May 1945, while serving in the Sanitary Corps of the U. S. Army, Cushing was awarded the U. S. Army Typhus Commission Medal for "unusual ability in developing and applying modern methods of typhus control." His citation stated "Colonel Cushing's application of typhus control measures contributed greatly to a general reduction of the risks of infection in the Western European combat zone."

Before joining the Bureau of Entomology and Plant Quarantine in 1928, Colonel Cushing was on the staff of the Texas Agricultural Experiment Station. His work in the Bureau has been chiefly on investigations of insects affecting man and animals, and he served for several years as assistant leader and later leader of that Division.

Except for brief periods of furlough to serve in the Air Service during World War I, to continue his education, and to work in private industry, Dr. Dove held appointments in the Bureau from July 1913, chiefly in connection with work on insects affecting man and animals and in directing large-scale grasshopper control operations. It was under his direction that the work of the Orlando, Fla., laboratory was carried on during the war. It included the development of DDT as a mosquito control agent, and MYL and DDT louse powders, and of new insect repellants including the combination of dimethyl phthalate, Indalone, and R-612, effective against mosquitoes, chiggers and other insects. All these wartime developments were used extensively by the allied armies, greatly reducing diseases carried by insects, and were a major factor in the successful prosecution of the war.

The Division of Insects Affecting Man and Animals is responsible for investigating disease-carrying and annoying insects that attack man, or those injurious to household supplies, fabrics, drugs, and other materials, pests that annoy or injure farm and range animals, and those that attack poultry, birds, and wildlife.

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The COVERED WAGON folks deliberately chose to endure hardships and peril. They braved the scorching heat of the plains and the cruel cold of the mountains. They faced freezing winds and blistering heat with equal courage. They made their stout-hearted choice because they were Pioneers—men and women ready to risk all for something better.

This spirit of Pioneering has made America great. It has created this ocean-to-ocean nation. It still lives. It is a permanent American trait—visible in every phase of American progress. Thinking ahead—the search for better living. That's the American Way.

The SPARHAWK COMPANY has followed this "PIONEERING" spirit in their Development of American Animal Fixatives, improved methods of Domestic Distillations—in search for new products and better qualities.

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A trial order will convince you.

Ce-Co Exterminating Products Co.

877 FULTON ST., BROOKLYN 16, N. Y.

Increase of Rat Infestation on Vessels Coming to New York

By ROBERT OLESEN [2]
Medical Director, United States Public Health Service

THE DESTRUCTION by hydrocyanic acid gas of considerable numbers of rats on vessels coming to New York from foreign ports has directed attention to the increased infestation of such craft and the potential danger to the United States. The necessity for constant surveillance over these vessels and their prompt fumigation when this procedure is indicated is clearly shown by recent experiences. Among the infested vessels lately encountered in New York was a frighter, which arrived with a history of having visited several foreign ports known to be or suspected of being plague infected. This vessel had called at several such places. Upon arrival in New York a preliminary routine survey made by trained inspectors during the routine quarantine inspection disclosed evidence of "many rats." The vessel carried an unvisaed exemption certificate from the authorities in a foreign port, certifying that conditions in that port and on the vessel were satisfactory to the officials.

In New York a further and more detailed sanitary inspection was made to determine whether the preliminary estimate of infestation was sufficient to warrant fumigation of the vessel. An experienced sanitary inspector from the New York quarantine station found that the infestation was extensive, a preliminary estimate of "more than 200 rats" being made.

The vessel was fumigated with hydrocyanic acid gas on February 27, 1945, the result being the destruction of at least 384 rats. All of the dead rodents were found in the holds and none was discovered in living quarters, storerooms, and other compartments of the vessel.

In this connection it has been interesting and also disconcerting to note a considerable increase in the number of rats destroyed by fumigation on vessels during the past few months. Apparently there has been a relaxation in repressive efforts in several of the foreign countries visited by vessels prior to entry into United States ports. Among these untoward results the following specific instances (table 1) may be mentioned after inspections and subsequent fumigations in New York.

TABLE 1.—Excessive numbers of rats recovered after fumigation, in New York, of several vessels from foreign ports, during January, February, and a portion of March, 1945.

Date of Arrival	From—	Number of Rats	
		Estimated	Recovered
Jan. 15	Alexandria and Liverpool	125	134
Jan. 24	Alexandria	20	98
Feb. 8	Oran	50+	148
Feb. 17	Wales	35	76
Feb. 24	Casa Blanca	200+	384
Mar. 1	do	75	67
Mar. 3	Port Said	50	76
Mar. 4	Liverpool	35	188

The rats obtained in these and other fumigations were subjected to autopsy in the laboratory of the New York Quarantine Station. Experimental animals were also inoculated with portions of liver and spleen to determine whether plague infection was present. Fortunately these inoculations were without result.

Without more tangible evidence it would manifestly be unfair to allege that vigilance over rat infestation of vessels has been dangerously relaxed in certain foreign ports. However, it can be said that the situation whereby considerable numbers of rats are permitted to infest vessels destined for United States ports is potentially dangerous to the public health and is causing apprehension. Therefore, sanitation officers generally, and particularly in the United States, should increase their efforts to discover and destroy rodents on vessels.

In addition to the major incidence of rat infestation noted in table 1, the usual number of fumigations was performed on other vessels. Thus, in January 1945 there were 18 other fumigations which resulted in the extermination of between 5 and 30 rats on each vessel. In February there was a total of 22 fumigations, with a total "kill" of 855 rats, most of these being recovered on the 3 vessels fumigated during the month. Lesser numbers of rats were destroyed on the remaining 19 vessels.

[1] From the Foreign Quarantine Division.
[2] Chief Quarantine Officer, U. S. Quarantine Station, Rosebank, N. Y. (Deceased, Aug. 16, 1945.)

Public Health Reports, Vol. 60, Nov. 2, 1945. No. 44.

Riedeburg Joins Westvaco Sales

Theodore (Ted) Riedeburg has joined Westvaco Chlorine Products Corporation, New York, as Technical Service Representative in charge of Westvaco Insecticides and Fumigants including D.D.T., Methyl Bromide and Grain and Soil fumigant mixtures. In his new capacity, Mr. Riedeburg will be available for consultation with executives, plant managers and sanitation engineers on problems concerning insect infestation.

A graduate in Botany and Chemistry from Marquette University, Mr. Riedeburg was until recently connected with Dow Chemical Company for three years developing Methyl Bromide and other fumigants for use in industrial and food-plant sanitation. He has also written a number of articles on food-plant sanitation.

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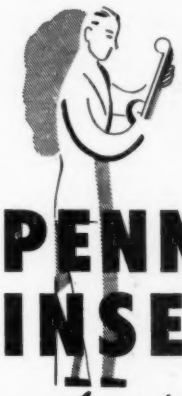

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- **FLOATS LONGER**
- **EVAPORATES COMPLETELY**
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When you use Penn-Drake INSECTI-SOL as the base for your insecticides, you get the best results, because INSECTI-SOL stays odorless and is 100% volatile—will not soil or stain since it evaporates completely. It floats longer, giving maximum penetration.

It works perfectly with DDT crystals in low concentrations or with solutions of DDT. Specify Penn-Drake INSECTI-SOL as the base for your insecticides, and be sure you have the best, most saleable product.

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WHAT'S NEW IN PEST CONTROL-PERSONALS

MARRIED: LE ROY A. WEISBURGER, associated with the insurance firm of B. & D. A. Weisburger, N. Y., was married to **MISS SHIRLEY LEDERMAN** on January 6. Scene of the happy and festive occasion was the regal "Starlight Roof" atop the Hotel Waldorf-Astoria, N. Y., with over 200 guests present, a number of them from the Industry. The couple honeymooned at the National Hotel, Miami Beach, Fla. LeRoy was honorably discharged recently from the Navy after almost five years of service as a radio operator, having seen action—and how!—in the European, African and Asiatic war zones. Warmest well wishes and heartiest congratulations to LeRoy and Shirley!

THE HILL TERMITE CONTROL SYSTEMS, of Memphis, Tenn., will exhibit its system of termite control in new construction at the annual convention of the National Association of Home Builders, scheduled for February 25-28, 1946, at the Stevens Hotel, Chicago, Ill. It is expected that thousands of builders from all parts of the country will attend, many of whom will no doubt seek further information on the Hill Termite Control System. Leads thus obtained will be turned over to termite control operators who represent the firm in their respective cities. Termite control operators attending the convention are cordially invited to stop in at the "Hill" booth for a visit with Mr. W. B. Hill, head of the firm.

F. R. ANDREWS, Andrews Exterminating Co., of Kansas City, Mo. has opened an office, located 414 Butts Bldg., Wichita, Kansas. George H. Schollenberger of Wichita is the manager.

The new office of Andrews Exterminating Co., of Kansas City is now 506 Law Bldg. Due to expanding, Mr. Andrews will retain the former office and plant.

Mr. Andrews has been in pest control business over 25 years.

We wish you all the prosperity and good wishes.

W. K. DELPLANE, JR. of Urbana, Ill., paid Pests office a visit. He and his wife are visiting wife's parents who live in K. C. Within a few days they will return home.

Come again. Always pleased to have friends call on us.

HYGIENIC SANITATION CO. of Washington, D.C., takes pleasure in announcing their new office, 1507 M Street N. W.

PENN SALT NAMES TWO NEW SALES MANAGERS

J. G. BRUNTON has been named Eastern Sales Manager and **J. F. FRANCIS** has been named Western Sales Manager of the Agricultural Chemicals Division of Pennsylvania Salt Manufacturing Company. Both Mr. Brunton and Mr. Francis have been serving as assistant sales managers in their respective territories.

Mr. Brunton, a graduate entomologist of the University of California, joined the Company in 1939. Mr. Francis, a graduate entomologist of the same university, came with Penn Salt in 1943.

Sacramento.—**ALLEN B. LEMMON** has been named Chief of the Bureau of Chemistry, State Department of Agriculture, the Department announced today. Mr. Lemmon ranked first in a state civil service examination to qualify candidates to fill the position.

Mr. Lemmon entered the state service in 1933 as an inspector of economic poisons and fertilizers, Bureau of Chemistry. He has been acting in charge of the Bureau since the retirement of the former chief.

The new Chief is a graduate of Leland Stanford Jr., University, receiving an A. B. Degree in 1930 and a Degree of Engineer in 1932. He received his high school education in Palo Alto. He is married and lives with his family in North Sacramento.

MM&R INITIATE 51ST YEAR WITH 3-DAY SALES CONFERENCE.—The first all-inclusive sales conference in four years inaugurated the second half-century for Magnus, Mabee & Reynard, Inc., prominent essential oil house.

Members of the sales staff from all over the country, executives and MM&R representatives from Mexico, Cuba and Canada assembled in New York for the three day sales conference, January 4, 5, 6. Sessions were held in the Hotel Warwick and in the company's New York laboratories.

The three day meeting was under the chairmanship of A. H. Downey, director of MM&R's technical department. New uses for many essential oils, new replacement oils, advanced techniques was the subject of several sessions. Post-war sales policies were plotted and extensions of MM&R customer service was reviewed.

"101 WAYS TO BE YOUR OWN BOSS," a book by Michael Gore, vice-president and radio director of Jasper, Lynch and Fishel, N. Y. advertising agency, has just been published. Included in Mr. Gore's book is a chapter on pest control as a business opportunity.

WHEN A FRIEND of ours saw his young twin daughters watching a spider slide up and down in the air, he decided he'd explain how the spider traveled by letting out a thread from inside itself.

"Oh," piped one of the girls, "just like a yo-yo!"

Even back in his vaudeville days, **FRED ALLEN,** star of radio and stage, was noted for his ad libs on and off stage. One day at the Old Winter Garden, N. Y., he was sitting in the spotlight, strumming a banjo. A mouse scampered across the stage and, blinded by the light, crouched beside Allen. He picked it up, put it in his pocket, and said, "Gee, I didn't know my act was that cheesy."

DDT REPORT AMENDED: In connection with the report on results of fogging Philadelphia (Pa.) police stables with DDT in the control of flies, appearing on p.34 of November Pests, our attention has since been called to the fact that the "actual residual results . . . lasted for only one week." This was based on information given a member of the Industry by "Herbert Packer, Chief of the Division of Housing and Sanitation, Philadelphia Bureau of Health, under whose jurisdiction and personal supervision the work was actually done."

Under the title **"DDT—JUST BEGUN TO FIGHT,"** Fortune for January reports in detail on the "miracle insecticide": its history (since 1874), its range of effectiveness, its hazards—and some hysterical faiths and fears it has already inspired. The article appeared in the December issue.

DEVELOPS NEW INSECTICIDE.—A new DDT concentrate, known as Pestroy, designed to provide farmers, stores, hotels, hospitals, and other commercial users with an economical, safe and easy-to-use insecticide, has been developed by Sherwin-Williams Co. for immediate distribution through commercial outlets, the company announced yesterday. Pestroy, according to the company, is a 25 per cent DDT concentrate which, when diluted with water, can be sprayed or brushed on any surface to destroy flies, fleas, roaches, bedbugs, ants and other common insect pests.

DDT PRODUCTION.—DDT is now being produced in the United States at the rate of 2,750,000 lb. a month but available supplies are still less than demand, according to the Department of Commerce. Domestic production not only has to supply the large civilian demand in this country but practically all of the world except Europe, which is obtaining required quantities from England and Switzerland.

The price has been reduced from $1.60 a pound during the early days of production to $0.45 in drums at the place of manufacture. Manufacturers believe that advances in technologies and other factors will eventually permit lowering prices to a competitive level with other insecticides.

WIZO
RAT GLUE BOARDS

Eliminate Use of Poison!
Require No Bait!

A practical and economical way to rid buildings of rodent pests! No hazards of poisoned bait . . . or of decomposition! Easy to prepare! Just place WIZO Rat Boards near rat hole or form a runway next to walls. Fasten boards to floor to prevent pulling away. Rodents are caught firmly the moment they step on the boards.

WIZO RAT GLUE can be obtained in quantities for preparing your own boards. Write for complete particulars.

ELKAY PRODUCTS CO.
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Economically, Permanently, Positively and **Lawfully** from any type of structure.

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GREATER *Kills* with CERTOX

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Rodent Seed, Ant Jelly, Arsenic, Carbolic, Pyrethrum, Cresylic, Red Squill, Derris Powder, and other effective chemicals that do a thorough job for the Pest Controller. The quality of CERTOX products remains unaffected by the national emergency. Prices, too, are near normal.

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All CERTOX products are manufactured according to exacting specifications under personal supervision of I. H. LUTTAN, B. S. A., Entomologist.

SPECIAL CONTRACT PRICES Available to Cover your Annual Needs.

YORK CHEMICAL CO.

Suppliers of Complete Exterminating Chemicals.

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MICE-GLUE

GETS MICE LIKE FLYPAPER GETS FLIES

10 lbs. $6.00 25 lbs. $13.50 100 lbs. $45.00

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Keeps Pigeons, Starlings and Other Birds from Buildings

10 lbs. $6.00 25 lbs. $13.50 100 lbs. $45.00

PHOSPHORUS-PASTE

For Rats, Mice and the Large Brown and Black Roaches

10 lbs. $4.25 25 lbs. $9.00 100 lbs. $32.50

PEST CONTROL CHEMICALS CO.

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BLITZ BRAND SPECIALS

5% DDT Residual Type Spray, Blitz Brand

5 gallon drums.....$1.50 gal.
30 gallon drums..... 1.25 gal.
55 gallon drums..... 1.00 gal.

Blitz Brand DDT and Pyrethrum Spray 5% DDT and Pyrethrum Extract

5 gallon drums.....$1.90 gal.
30 gallon drums..... 1.65 gal.
55 gallon drums..... 1.50 gal.

Blitz Brand DDT-Pyrethrum-Lethane Spray

5 gallon drums.....$2.00 gal.
30 gallon drums..... 1.80 gal.
55 gallon drums..... 1.60 gal.

Above prices include drums which are returnable.

Blitz Brand 10% DDT Powder

Ton lots .....20c lb.
100 pound lots.....23c lb.

Blitz Brand Paradichlorobenzene Moth Crystal

One drum to a customer

100 pound drums.....26c lb.
200 pound drums.....24c lb.

All prices F.O.B. Terre Haute, Indiana.

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NON-poisonous to humans, pets, domestic animals. Scientifically prepared to kill rats, mice and moles. Get your trial order to prove its effectiveness, $1.00. Send in your request now. Packed in 3 oz. and 16 oz. containers or in bulk.

Per-Mo 2 Way Rat and Mice Liquid

Use As a Drink or Mix With Dry Bait

Just mix four parts of water to one part of concentrate and it's death to rats and mice—it's so economical to use.

16 oz. bottle supplied to you, postage prepaid, $1.00.

Order yours now! Available in package or bulk.

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Moth Proofing Liquid . . .

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You can cover your territory with moth proofing liquid and end the life of the moth. . . . PER-MO Moth Proofing Service and Sales are big profit-makers. Available in package or bulk.

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PER-MO PRODUCTS Will Be Packed Under Private Label. . . . Full Particulars and Prices on First Letter.

Approximately 200 companies have been licensed to manufacture DDT compounds under Geigy & Co. patents.

—*Chem. & Eng. News*, 12-25-45.

Jack Crowe, Managing and Director of Boracure (N. Z.) Ltd., of Wellington, New Zealand, spent a few hours in Pests office. Jack has been spending six months in this country visiting various wood treating firms.

They have eight offices throughout New Zealand.

Their system of treating homes for wood borers is outstanding. It is understood that they have one of the most complete experimenting laboratories known.

Jack Crowe desires through the columns of Pests to express his sincere appreciation for the splendid hospitality and reception given to him by those whom he has visited.

He states that his trip in this country has been very cordial and helpful and he has enjoyed himself in many ways.

Come again, Jack, when you are in the good old U.S.A.

DDT IN PAINTS.—According to industrial reports from the Department of Commerce, states **Oil, Paint & Drug Reporter**, wall paints seem to be one of the most promising carriers for DDT. However, the value of this material as an insecticidal paint depends upon its proper formulation. The effectiveness of DDT in semigloss and gloss oil paints and synthetic enamels remains to be demonstrated. It is reported to be an excellent barnacle repellent suitable for antifouling paints.

STAINPROOF WALL COVERING. — A stainproof wall covering, to be known as Varlon, will be introduced sometime in July, 1946. The new product will be marketed by Varlon, Inc., a division of United Wallpaper, Inc., of Chicago, Ill., world's largest wallpaper manufacturers and originators of Unitized wallpaper and Trimz Ready-Pasted wallpaper, it was announced in January by William H. Yates, United president.

The result of nine years laboratory research and development, the new stainproof wall covering will permit the removal of almost any type of dirt, grease or stain by the simple application of soap and water. The product, it is stated, has been undergoing field tests for the last ten months where it has withstood severe wear and tear in numerous public places, such as government office buildings, restaurants, theatres, hotels, etc.

Field tests have proved that heretofore indelible stains, such as lipstick, hot grease, crayon, ink, etc., require only soap and water for removal.

The new stainproof wall covering, which the manufacturer states should not be confused with wallpaper, will be sold by the square foot.

LOCAL ORGANIZATION NEWS

Northern California Pest Control Association

The regular quarterly meeting of the Northern California Pest Control Association was held on January 12 at the Shattuck Hotel in Berkeley, Calif. It was an all-day meeting, program outline of which follows:

DDT Applicators — V. H. Montgomery, Chairman.

Termite Control—Wayne K. Davis, Chairman. (Costs and their relation to prices.)

Luncheon—Shattuck Banquet Room—General Discussion.

Rodent Control — E. G. Mills, Chairman. Methods and their relation to prices.)

Labor Relations — Charles Menard, Chairman.

Annual Business Meeting—V. H. Montgomery, Presiding.

Northern California Pest Control Association Annual Meeting

The first regular meeting of the Northern California Pest Control Association since the organization meeting was held in Hotel Shattuck, Berkeley, on January 12. Members were present from as far south as Fresno and others from Nevada attended.

V. H. Montgomery demonstrated an improved sprayer for DDT which has been perfected for operators use. Ted Sibert of Paramount exhibited a portable type of machine which produces a very fine spray by means of gas pressure somewhat as is done by the aerosol bomb. Both machines are light enough to be carried by one man.

Wayne K. Davis spoke on costs in connection termite control. Figures which were supplied him by a number of different operators showed a fairly close agreement in the proportion of costs chargeable under the more important headings. Considerable valuable discussion arose on this important topic.

E. G. Mills led in a discussion of costs in relation to rodent control. Amplifying his remarks to include costs in other types of work he said that to be profitable to his employer a service employee should do from $30.00 to $40.00 worth of work per day.

Charles Menard of the Rose Exterminator Company spoke of the present status of labor organizations in the pest control industry.

A helpful kink in termite control was given out by C. P. Cain of Fresno. Precast concrete post blocks as usually shaped are very hard to handle under a house. By casting them in a cylindrical shape they can be easily rolled into position. Forms for casting are made in two separable parts and can be used over and over again.

A motion presented by E. O. Corson proposed a committee to consider the establishment of a course in pest control at the University of California. The motion was passed with no dissenting votes.

The officers who have been serving temporarily during organization proceedings were reelected.

The next meeting will be held at Sacramento in April.

It was announced that it has not been possible to arrange for a Pacific Coast Conference in February and that it is not likely that one will be held this year.

Meeting New Jersey Pest Control Association

A regular meeting of the NJPCA was called to order by our President David P. McAlinden.

The newly elected officers also include: Vice-President, Walter Boyce; Secretary, Abe Charnack; Treasurer, Harold Kutakoff.

Mr. Joe Geisman was welcomed back to civilian life after spending 2½ years in service.

J. E. Sameth, chairman of the Educational Committee, reported that final plans for the short-term course to be given at Rutgers College of Agriculture in Termite Control and Rodent Control were practically completed. Announcements were expected to be sent out in about ten days.

A short discussion took place on the desirability of a hospitalization plan, which would benefit group or individuals.

President McAlinden announced that a Public Meeting would be held some time in April, and that subjects concerning public health and welfare would be presented.

The Association was in favor of establishing a definite meeting night and it was decided that the third Wednesday of each month regular meetings would be held.

John Medoff reported that a banner for the NJPCA had been ordered and that the colors would be blue and gold.

A recommendation was made that an annual installation dinner be held each year, and this plan met with the approval of all members. At the conclusion of the meeting two guest speakers were announced, namely: Mr. Irving Hirschman, a Certified Public Accountant, who spoke on new accounting practices affecting PCO's. Professor Robert Filmer of Rutgers College gave a very enlightening talk on the mechanics of chemical compounding. Members present at the meeting were:

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Fred Bowers, Bowers Labs.
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Wasch, North Jersey Termite Co.

Michigan Pest Control Operators Association

Second Annual Short Course Conference of the Michigan PCO Association is to be held at Michigan State College, East Lansing, Mich., March 13-14, 1946. A constructive program of relevant interest is being planned.

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If, perchance, you are unable to attend and would like a copy of the "Conference Manual" anyway, you can do so by sending a check for $3.00 to Mr. Van Core.

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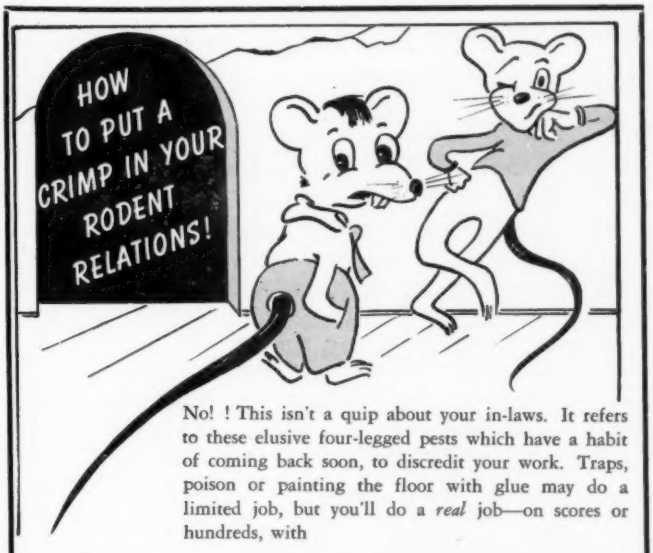

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III. Lower Animals. Protozoa, worms, snails, millepedes, spiders, mites, many others, as far as they are housepests. Pages: 112.

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